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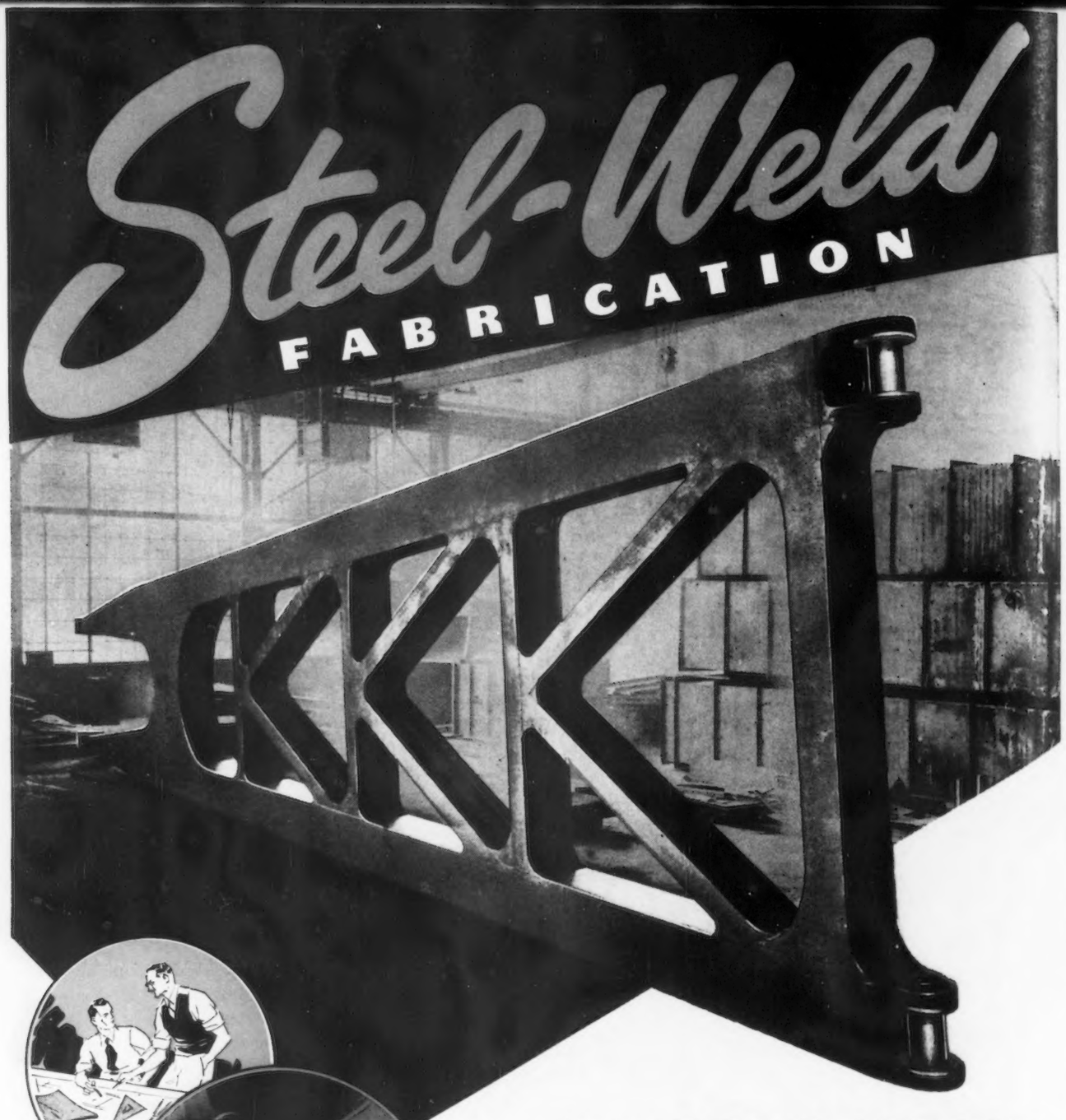

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Hair Tonic

"I'LL be damned if I will pay 50 cents for a bottle that size. They can take their hair tonic and jump in the river with it." The gentleman blowing off steam is a fellow-toiler whom we have known for many years. The object of his indignation was a bottle of well-known hair tonic the size of which had just been reduced, presumably because of rising costs.

Whether the decision to cut the size of the bottle was necessary or wise we leave to the producer. Time and the response of other consumers will provide the final judgment.

The man who rejected the 8 oz. bottle is a stockholder of the company which makes the hair tonic. To our knowledge, his net worth is stated in 7 figures. He is an able citizen with substantial earning power. As a consumer he has not gone on strike because he could not afford the price of the smaller bottle. He had ample buying power to pay the price. He refused because his sense of values had been outraged. He might have refused for other reasons, none of which had any relation to the size of his bank balance.

Here is an inflation lesson which our ambitious stabilizers would do well to note. Inflation is a complex phenomenon which has suffered from over-simplification. Such A B C exposition usually shows the "total supply of money" or "aggregate consumer expendable income" on one side of an equation and available goods on the other. Whenever the former goes up or the latter down, the boys in Washington reach for their slide rules and solemnly advise us that inflation is imminent.

The time has passed, unfortunately, when such an opinion could be passed off as the innocuous obiter dictum of a bureaucrat trying to be important. Such alleged distortion in the relation of buying power and goods has served increasingly as the pretext for added authority, for statutory power to control prices and push citizens around.

A case in point is the renewed demand for controls putatively made necessary by tax relief, by aid to Europe, by the rearmament program. Tax relief will increase buying power, aid to Europe will reduce the available supply of goods, rearmament will bring the government into the market as a powerful buyer. Hence, prices will go up. Therefore, controls are necessary, Q. E. D.

This transparent syllogism impresses many citizens who are unable or unwilling to subject it to critical analysis. Men are not involuntary automatons who invariably respond by formula to the changing circumstances of money, credit and goods. In spite of the economic determinism of Marx which so many of our liberals accept, men have independent wills and exercise them sometimes in belligerent defiance of conditions which presumably dictate their conduct. The mere fact that a man has money does not mean that he will rush into the market to spend it. He has an infinite variety of options, including the refusal to spend it at all.

Let us beware of the bureaucrat who waves his slide rule, who predicts inevitable and imminent catastrophe, who knows precisely how to forestall it. The formula always includes a little more authority for him and a little less liberty for the rest of us.

Joseph Stagg Lawrence

A RESTATEMENT of POLICY Regarding the Distribution of INLAND STEEL

★ ★ ★ ★

During recent weeks several individuals, entirely unknown to us, have made offerings of Inland steel to consumers, or indicated their ability to make arrangements with us for the conversion of steel supplied by others.

No such representations have ever been authorized by us, and they are therefore false. All of our sales, including conversion arrangements, continue to be handled exclusively by the Inland organization directly with our customers. We do not deal with brokers or intermediaries of any kind.

We would be glad to have steel consumers call to our attention any such representations which might be made to them. They will be passed along to the proper government authorities.

All transactions—sales of our own steel and conversion arrangements—are made with the understanding that manufacturers are purchasing the products for their own use and not for resale. It is our announced policy to discontinue sales to any customer violating this understanding.

We are taking every possible precaution to make sure that our steel will be directed into proper channels. We feel sure that we have the support of steel consumers in this endeavor.

INLAND STEEL CO.
Chicago

★ INLAND STEEL ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

► The ability to produce cupola hot metal, for charging into the open-hearth, at costs less than the going price for pig iron, is arousing interest among cold metal steel shops. Resembling miniature blast furnaces in appearance and operation, the cupolas, which function alternately and in pairs, are capable of up to 98 hr continuous operation.

► Chances are that foreign industrial exhibits will be admitted to the International Industrial Exposition at Atlantic City duty-free. Congress is inclined to suspend the usual import duties on goods which are imported expressly for the industrial exhibition, which runs from June 26 to Sept. 11.

► Greatest utilization of transfer-type machining lines is by the automotive industry. Automatic control of fixturing and machining, possible because of the repetition of production, has resulted in definite economies in engine and part production. Several such lines are now in operation, and the benefits accrued will result in more widespread use of this technique.

► The British government has finally made up its mind about the form of nationalization it wishes for the iron and steel industry and has sent its ideas to a drafting committee. Present idea is for the government to acquire the shares of iron and steel producing firms. But firms will retain their identity and present management.

► Use of a gas-fired reverberatory furnace, in place of a pot-type unit, for melting zinc base diecasting alloys is said to result in a reduction of 35 to 40 pct in direct labor and fuel costs. Oxidation losses in the reverberatory unit range from 0.5 to 1 pct.

► The promised whopping increase in auto plant capacity during the postwar period is now an accomplished fact. Once an adequate bank of materials is available, it will be possible for the industry to turn out 150,000 to 160,000 cars per week, with only a few departments working two shifts. Top production before the was was about 125,000 vehicles per week.

► A practical production process for electroplating magnesium metal is now being licensed to qualified plating shops by a large chemical company which has had the method under development for several years. The process is expected to expand the use of magnesium by allowing plated coatings to bolster the wear and corrosion resistance properties of the metal.

► The dangerous depletion of British stockpiles of scrap and pig iron is causing a stir of comment in that country. Most frequently blamed is the government failure to implement the program for importing scrap and coke supplies. Gloomy outlook on scrap is reflected by the fact that no more than 5000 tons a week at best are expected from Germany, where Britain has had far better success than the U.S. in obtaining scrap in the past.

► A graphical method for predicting weld metal composition and structure, eliminates the necessity for trial and error experimentation, and facilitates the joining, by metal arc welding, of dissimilar alloys and superalloys.

► High costs are proving a big factor in causing some auto producers not to make extensive model changes every year. Model changeovers are estimated to have cost Ford $90 million, Hudson $16 million and Packard $15 million, while, under today's conditions, new Chrysler tooling is expected to cost $60 million and the General Motors cost is expected to be even higher. Add this to a sellers' market and the result indicates major changes every 2 or 3 years, rather than every year.

► The lead industry expects domestic mine production this year to exceed last year's 375,000 tons by 10 to 15 pct, barring strikes. The opening of new ore bodies at recent price levels has progressed rapidly, expecially in Idaho, where rich yields at deep levels are being exploited. Several foreign lead operations show great promise, but the long Mexican strike will hold down the prospect of increased foreign production this year.

► The 18 pct drop in new industrial building during the first quarter of 1948, compared with the first quarter of 1947, has some economists in a dither. The fact that total construction was nearly one fourth more than a year ago, due largely to a sharp increase in residential building, does not brighten their gloomy view of the business cycle.

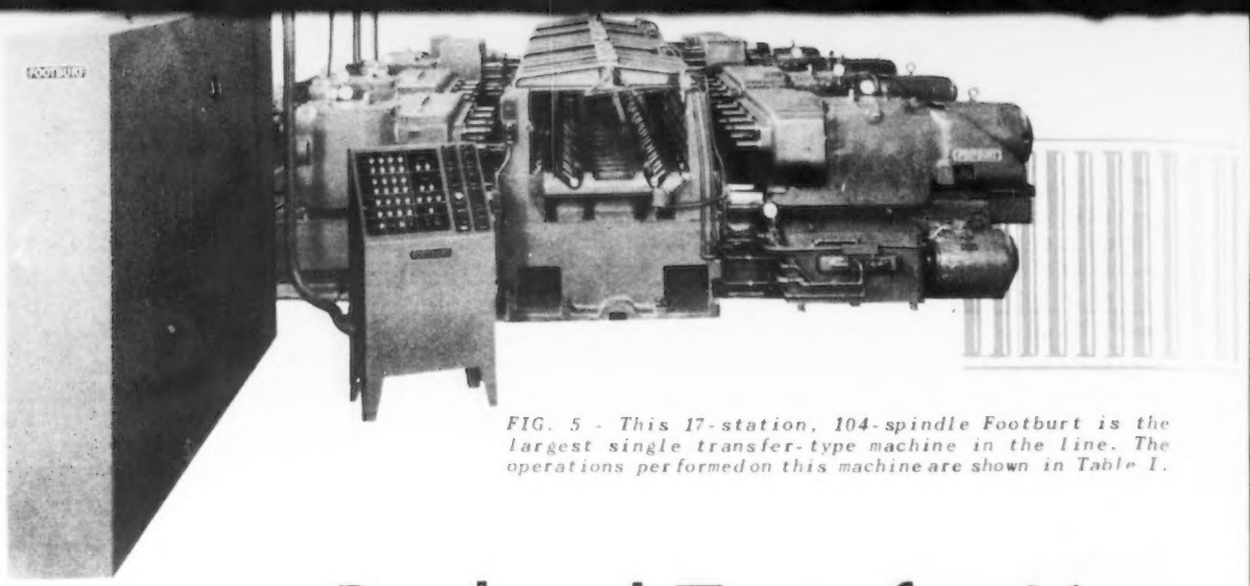


FIG. 5 - This 17-station, 104-spindle Footburt is the largest single transfer-type machine in the line. The operations performed on this machine are shown in Table I.

Packard Transfer Line

IN tooling for 1948 model production, the Packard Motor Car Co. has installed an automatic setup for machining eight-cylinder engine blocks and for broaching the head, face and pan rails of the six-cylinder blocks. Utilizing transfer-type machines and roller conveyers to connect all operating stations, the company has been able to tool up for 50 complete eight-cylinder blocks an hour.

The machine and line arrangement are designed, as are the transfer-type machines, to permit subsequent changes in engine design without seriously disrupting production or causing any change in operational layout. The worst that can occur under the present tooling setup is the necessity of obtaining new drill heads and fixtures.

While it would almost be necessary to compare actual standard times on the blocks to see how much of an increase in production has resulted from the transfer-type line, there are obviously noticeable benefits in output. Previously, two engine block lines were in use, one for six-cylinder blocks tooled for 28 an hr and one for eight-cylinder blocks tooled for 15 an hr. Currently, in addition to the new eight-cylinder block line, Packard is operating a small line for six-cylinder blocks, the output of which goes mainly into taxicabs because Packard has discontinued its six-cylinder passenger car.

In addition to the block machining line; another transfer-type line was set up for cylinder block assembly. On this line required machining operations for final assembly are performed, such as finish-boring and honing cylinder bores, finish-boring cam and crankshaft bores and oil pump holes, and finish machining valve seats and valve tappet holes. This line is actually a continuation of the block machining line, and its speed is geared to the output of the initial transfer line.

Within the lines themselves, the individual operations are likewise geared to a definite productive performance. For example, where a specific operation takes considerable time, such as one of the boring operations, the line is split and two machines take alternate blocks as they come down the conveyer table.

Currently, the practice on tool maintenance for the various machines is for the night shift to change all tools in every machine, leaving a complete new tooling setup for the day shift as it comes on. This has been found more practical than to wait for a tool to dull and slow up the line or fail to maintain tolerances. Tool life on the line has not been as good as anticipated, but this is largely the fault of the engine block castings. Previously, it was the practice to maintain a minimum of 35 pct pig iron in the casting melt, but because of the difficulty involved in obtaining pig iron, this ratio has dropped to around 20 pct pig iron. While there is nothing physically wrong with such blocks, this mixture has a definite adverse affect on tool life.

It is difficult to visualize the scope of such a machining operation, but some idea of it can be gained from statistical study of the operations. In machining the block, there are 636 individual machining operations which includes 207 drilling 139 countersinking, 34 boring, 22 milling, ten reaming, five core drilling, and two each of broaching, counterboring and chamfering. While there are actually only two broaching operations, one for the pan rail and bearing caps and another for the top of the block, 120 individual broaching blades are used. Incidentally, the broaching operation on the top of the block is sufficiently accurate that the engine can be operated without a gasket.

As the engine blocks are received, they are checked for high spots on locating points and loaded on a roller conveyer that feeds the first machining operation. The first operation is broaching the pan rail and the bearing cap seats performed on a Cincinnati horizontal broaching machine. The block, bottom up and rear end forward, is positioned into a hydraulic holding fixture, which rotates the block 90° into the broaching position in the machine. The broach, traveling horizontally in a vertical plane, completely broaches the pan rail and bearing seats in one pass. When the fixture returns to its orig-

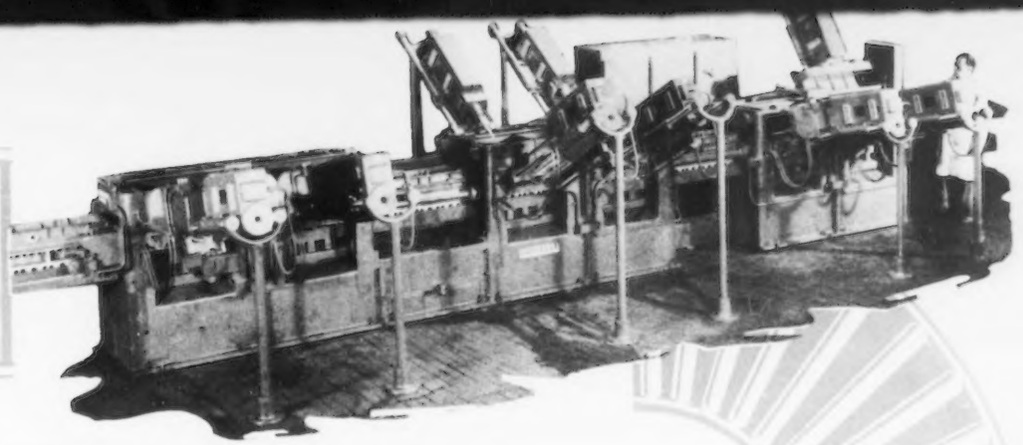


FIG. 7 - This Ingersoll six-station drilling machine, the oil lead holes, angular oil holes, the oil pump suction hold, and the distributor hole are drilled and finished. Operations in addition to drilling include reaming, counterboring, countersinking and tapping.

Machines 50 Blocks an Hour

inal position, the block is unclamped and proceeds on a roller conveyer to an inspection station and turntable which turns it front end first. Two locating holes, 0.625 in., are then drilled, reamed and countersunk. These holes are gaged for diameter and also for position in relation to the bearing cap seats.

A turntable then turns the block top up, front end first, and it is delivered to an Ingersoll two-spindle process m ing machine, shown in fig. 1, where valve covers and manifold faces are milled, and burrs and fins in port holes are removed. It then proceeds to another Cincinnati horizontal broaching machine, and by use of a fixture similar to that in the first operation, the entire top of the block is broached in one pass, as shown in fig. 2.

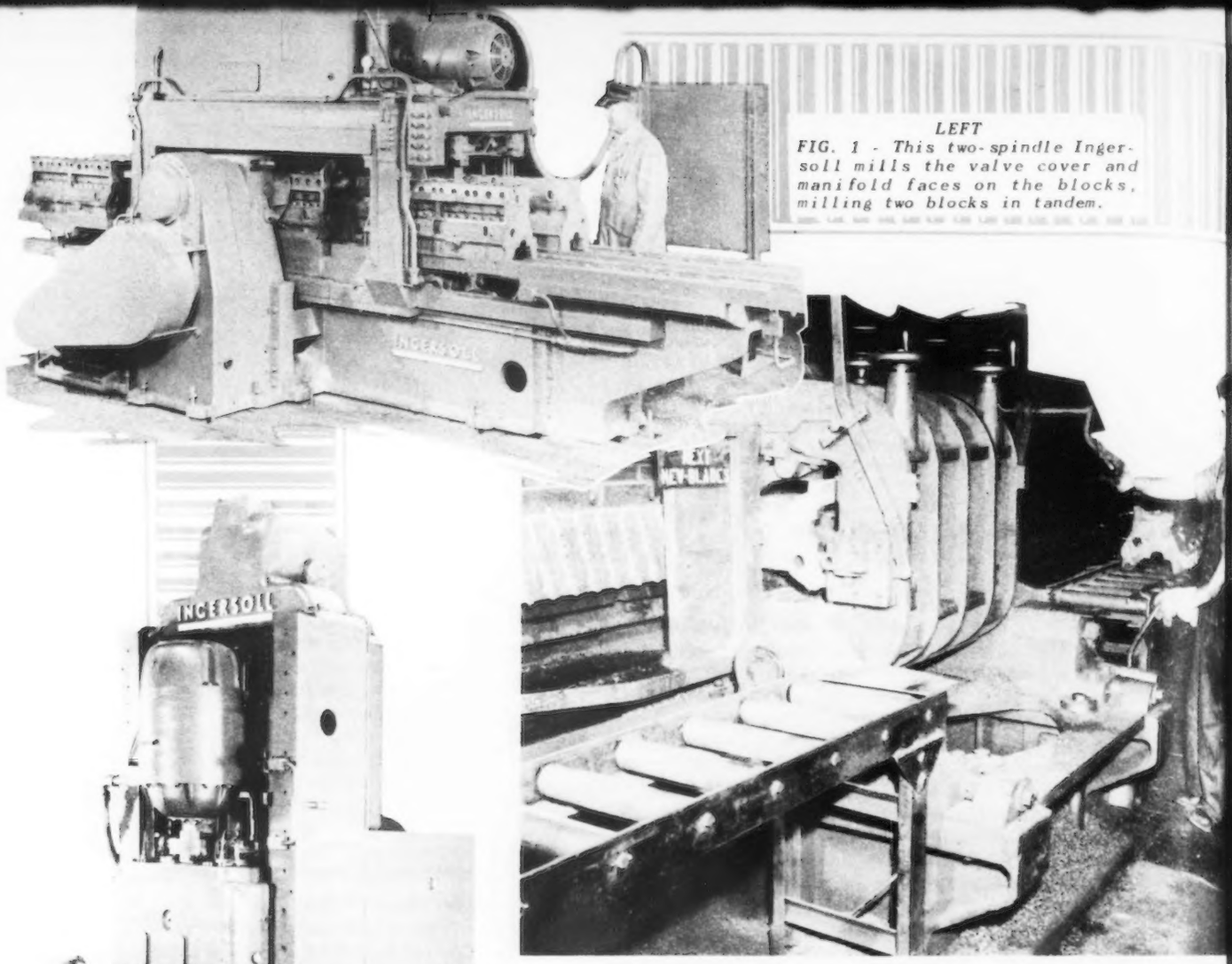
In the same position, the block is delivered to a four-spindle Ingersoll milling machine, where the pads for the distributor, fuel pump, oil pump and generator are milled. The next operation is done on an Ingersoll eight-spindle cylinder boring mill, fig. 3, which rough bores the cylinder bores to 3.460 in. diam, ±0.005 in. Another Ingersoll 16-spindle boring mill chamfers the tops and bottoms of each of the cylinder bores.

The next machining position is the first of the transfer-type machines, a four-station Ingersoll milling machine that mills the front and rear ends of the block which is delivered top up, front end to right. The first station, shown in fig. 4, finish-mills the rear face of the rear bearing and rough mills the front cover face and the water pump pad. Milling cutters used for these operations have 5, 7, and 11-in. cutter bodies, respectively. The second station finish mills the front cover face and the water pump pad, using 7 and 11-in. cutters. At the third station, the rear face and rabbet diameter is rough milled, and the fourth station finish mills these positions.

Remaining in the same position, the block is then delivered to the largest single transfer-type machine in the line, a 17-station, 104-spindle, unit type, hydraulic and lead screw feed horizontal drilling and tapping machine, designed and

Incorporating some of the latest designs of transfer-type machines, Packard Motor Car Co. completely machines 50 eight-cylinder engine blocks an hour. The machines and the production line are so designed as to permit subsequent changes in engine design by modifying present fixtures and acquiring new drill heads. The line, and the individual operations, are described in this article.

By THOMAS E. LLOYD
Machinery Editor,
THE IRON AGE

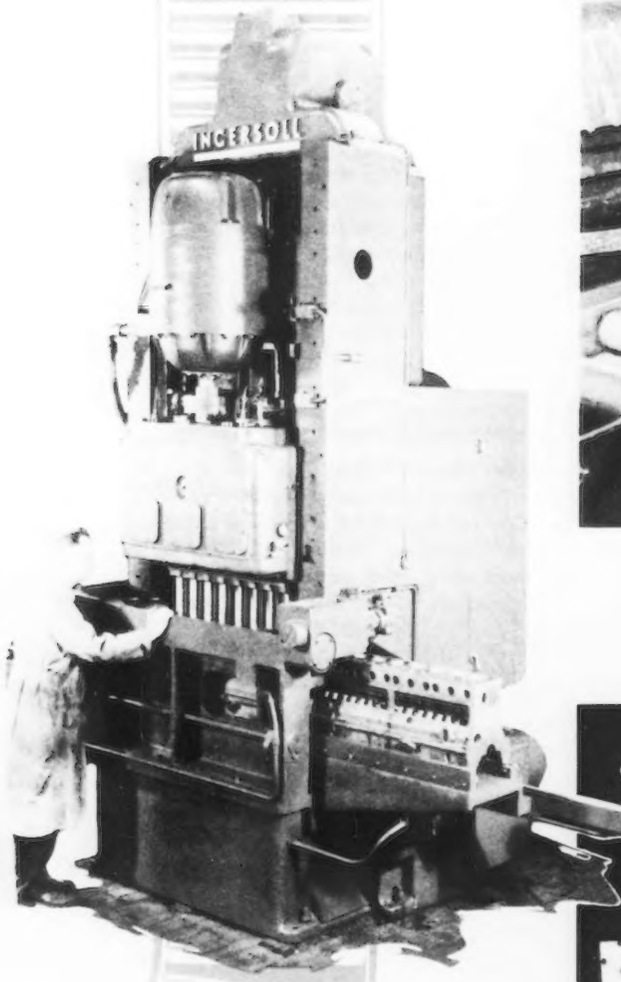


LEFT

FIG. 1 - This two-spindle Ingersoll mills the valve cover and manifold faces on the blocks, milling two blocks in tandem.

ABOVE

FIG. 2 - The head broaching operation, performed on a Cincinnati horizontal broaching machine, is similar to that of broaching the pan rails, and uses a similar fixture. It is reported that this broaching is sufficiently accurate to permit operating the engine without a gasket on the head.



ABOVE

FIG. 3 - Cylinders are rough bored to 3.460 in. diam. ± 0.005 in., on this eight-spindle Ingersoll boring machine.

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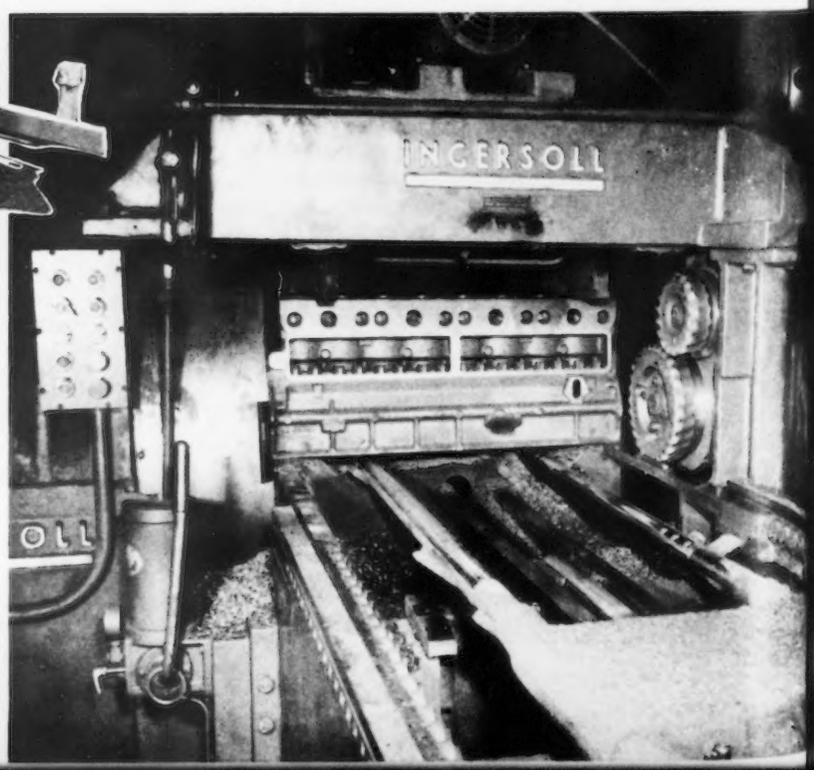
RIGHT

FIG. 4 - Front and rear ends of the block are milled on a four-station Ingersoll milling machine. Shown here is a block entering the machine.



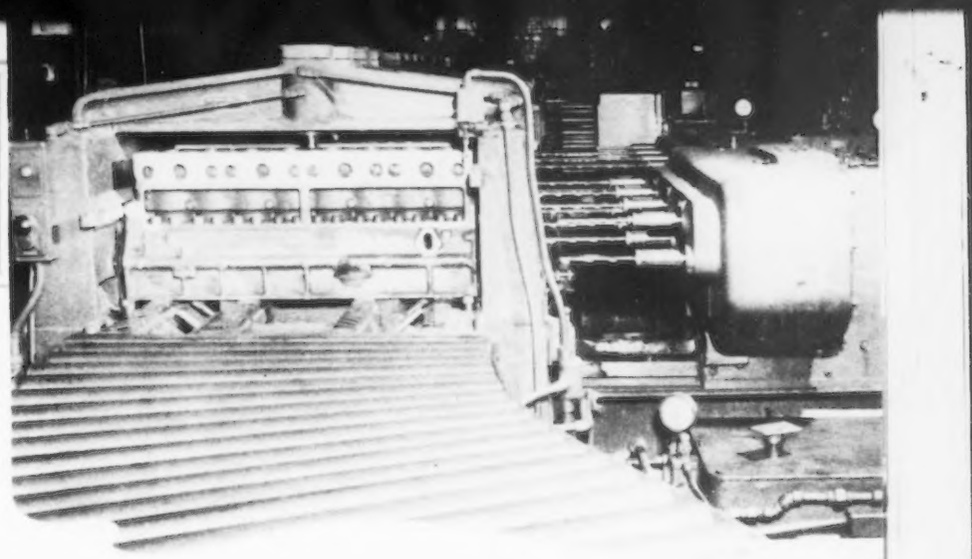


FIG. 6 - An engine block is shown here entering the 17-station Footburt. All machining stations are connected by roller-type conveyor tables.

build by the Foote-Burt Co. The machine has 12 operating and five idle stations, and the distance between stations is 15-in. The operations of this machine are shown in table I and the machine itself is shown in fig. 5. A block entering the first station is shown in fig. 6. As can be seen in these operational data, this machine performs 52 drilling, 24 tapping, 24 countersinking, and a reaming operation, with the engine block being positioned and machined automatically at the various stations. After unloading, drilled and tapped holes in the block are gaged, oil holes are brushed out and tested, and the engine block then is delivered by roller conveyer to the next machining position.

Here, the oil filler holes are drilled in the valve tappet bosses; and all holes in the distributor and oil pump pads are drilled, chamfered and tapped. This operation takes place on the second transfer-type machine, an Ingersoll five-station unit. At the first station, with the block in an upright position with the front end forward, the oil filler hole, 1.342 in. diam, is drilled, and 16 tappet boss oil holes, 0.188-in. diam are drilled. At the second station the oil filler hole is reamed to 1.372 in. diam, and the oil gage hole, 0.438 in. diam, is drilled. Two 0.316 in. holes and two 7/16 in. holes are drilled in the oil pump pad at the third station, as well as two 0.261 in. holes in the distributor pad. At the fourth station, the two holes in the distributor pad are countersunk 60° x 11/32 in. ±1/64 in. deep, and the two holes in the oil pump pad are countersunk 60° x 13/32 in., ±1/64 in. deep. These holes are then tapped in the final station. A 5/16 in. tap, 18 NC, No. 3 thread fit, with PD of 0.2764 to 0.2794 in., is used for each of the distributor pad holes and a 3/8 in. tap, 16 NC, No. 3 thread fit, with PD of 0.3344 to 0.3376 in., is used in tapping the oil pump pad holes. After inspection and gaging, the block is then turned over so that the bottom is up and the front end is forward, and it proceeds to another transfer-type machine, and Ingersoll six-station drilling machine, shown in fig. 7.

At the first station in this machine, five holes, 3 in. deep 21/64 in. diam are drilled. These are the oil lead holes. Also five angular oil holes, 1-5/16 in. deep, 1/4 in. diam, are drilled. The second operation is to continue the drilling of the holes to a depth of 5-25/32 in. At the third station a 1-13/64 in. diam oil pump hole is drilled, the oil pump suction hole is drilled, reamed, counterbored and countersunk, and a 13/16 in. diam distributor hole is drilled and counterbored to 1.115 in. diam x 9/32 in. deep. At the fourth station the distributor hole is bored to 0.845 in. diam; the oil pump hole is bored to 1.220 in. diam; and the oil pump suction hole is tapped, 11/16 in., 16 NC, No. 3 thread. Five oil lead holes are countersunk, 30° x 7/16 in. ±1/64 in. diam at the fifth station, and these five holes are tapped at the final station. These operations are then inspected and holes and threads checked, and the engine block is conveyed to an Ingersoll milling machine where the centers of the main bearings are straddle milled and the notches in the main bearings are milled.

The next operation takes place on a four-station, 124-spindle, unit type, hydraulic feed Footburt transfer-type drilling machine, shown in fig. 8. The machine has two operating stations and the distance between the stations is 54 in. At the initial station, the machine is loaded bottom side up, rear end forward, and the valve side of the block is to the right.

At the second station, 12 holes, 0.422 in. diam x 1.375 in. deep are drilled for the bearing cap bolts and 28 holes, 0.261 in. diam, are drilled in the pan rail on the vertical head, bottom face. On the right hand horizontal head, valve side, in this same station, ten 0.316 in. diam holes are drilled and four holes, 0.261 in. diam x 3.718 in. deep, for valve cover studs, are drilled from the cover face.

On the vertical head, bottom face, at the third station, eight 5/8 in. holes are drilled for the oil drain; 12 0.5 in. holes are countersunk 60° x 9/16 in., ±1/64 in. deep; 28 5/16 in. holes are countersunk 60° x 11/32 in., ±1/64 in. deep; and two 3/8 in. holes are drilled for the oil drain. On the right hand or valve side, at this third station, four intake ports, eight manifold stud holes, two fuel pump pad holes, and four valve cover stud holes are countersunk. At the final station, the block is unloaded and the operations performed are gaged.

The next operation in the engine block machining sequence is performed on a six-station, 120-spindle hydraulic feed and lead screw feed

TABLE I

Work Sequence and Operations on 17-Station, 104-Spindle Footburt Transfer-Type Machine (Block Position: Top Up, Front End to Right)

Station No.	Right Hand Horizontal Head of Machine Operating on Front End of Block	Left Hand Horizontal Head of Machine Operating on Rear End of Block
1	Loading Station	
	Eight spindle arrangement in four groups to span stations 2, 3, 4, 5, operating on front end of block. Mounted on hydraulic unit, 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.	Eight spindle arrangement in four groups to span stations 2, 3, 4, 5, operating on rear end of block. Mounted on hydraulic unit, 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.
2	First group of two spindles: Drill two 9/16 in. diam oil gallery holes, 2½ in. deep or 1/14 of total depth.	First group of two spindles: Drill two 9/16 in. diam oil gallery holes, 2½ in. deep or 1/14 of total depth.
3	econd group of two spindles: Drill two 9/16 in. diam oil gallery holes, to 5⅛ in. deep.	Second group of two spindles: Countersink two oil gallery holes, 60°x⅝ in. ± 1&64 in. hird group of two spindles:
4	Third group of two spindles: Drill two 9/16 in. diam oil gallery holes, to 7¾ in. deep.	Drill two 9/16 in. diam oil gallery holes to 5⅛ in. deep.
5	Fourth group of two spindles: Drill two 9/16 in. diam oil gallery holes, to 10⅜ in. deep.	Fourth group of two spindles: Drill two 9/16 in. diam oil gallery holes to 7¾ in. deep.
6	tation Idle Eight spindle arrangement in four groups to span stations 7, 8, 9, 10, operating on front end of block. Mounted on hydraulic unit, 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.	Eight spindle arrangement in four groups to span stations 7, 8, 9, 10, operating on rear end of block. Mounted on hydraulic unit, 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.
7	First group of two spindles: Drill two 9/16 in. diam oil gallery holes to 13 in. deep.	First group of two spindles: Drill two 9/16 in. diam oil gallery holes to 10⅜ in. deep.
8	Second group of two spindles: Drill two 9/16 in. diam oil gallery holes to 15⅝ in. deep.	Second group of two spindles: Drill two 9/16 in. diam oil gallery holes to 13 in. deep.
9	Third group of two spindles: Drill two 9/16 in. diam oil gallery holes to 18¼ in. deep.	Third group of two spindles: Drill two 9/16 in. diam oil gallery holes to 15⅝ in. deep.
10	Fourth group of two spindles: Ream one tappet oil gallery hole, 0.593 in. diam, +0.0010, —0.005 in. by 0.500 in., ±0.010 in. deep. Countersink one oil gallery hole, 60°x23/32 in. diam, ±0.016 in.	Fourth group of two spindles: Drill two 9/16 in. diam oil gallery holes through.
11	Station Idle Thirty-one spindle arrangement in two groups to span stations 12 and 13, operating on front end of block. Mounted on hydraulic unit 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.	Seventeen spindle arrangement, two groups, to span stations 12 and 13, operating on rear end of block. Mounted on hydraulic unit 16-in. wide; steel ways. Drive, 10 hp, 1800 rpm motor.
12	First group of 16 spindles: Drill 10 holes 0.261 in. diam, seven of which are through and three, 1-in. deep. Drill five holes 0.316 in. diam, two of which are through; one, 1-1/16 in. deep; two in. deep. Drill one hole ⅜ in. deep.	First group of nine spindles: Drill two ⅜ in. holes and ream to 11/32 in. Drill five 0.368 in. diam holes through and one 0.368 in. diam hole 1 in. deep.
13	Second group of 15 spindles: Countersink ten 5/16-in. diam tappet holes, 60°x11/32 in., ±0.016 in. Countersink five ⅜ in. tappet holes, 60°x13/32 in., ±0.016 in.	Second group of eight spindles: Countersink six 7/16 in. diam tappet holes, 60°x15/32 in., ±0.016 in.
14	Station Idle Sixteen spindle arrangement in two groups to span stations 15 and 16, operating on front end of block. Mounted on lead screw tapping unit 14 in. wide; steel ways. Drive, 7½ hp, 1200 rpm motor.	Eight spindle arrangement in two groups to span stations 15 and 16, operating on rear end of block. Mounted on lead screw tapping unit 14-in. wide; steel ways. Drive, 7½ hp, 1200 rpm motor.
15	First group of 15 spindles: Tap 10 holes, 5/16 in., 18 NC, No. 3 thread, PD of 0.2764 to 0.2794 in., seven holes through and three holes 9/16 in. deep. Tap five holes, ⅜ in., 16 NC, No. 3 thread, PD of 0.3334 to 0.3376 in., one hole through; two holes ¾ in. deep; one hole 7/16 in. deep; and one hole 13/16 in. deep.	First group of six spindles: Tap six holes, 7/16 in., 14 NC, No. 3 thread, PD of 0.3911 to 0.3947 in.
16	Second group of one spindle: Tap one oil gallery trunk hole, ⅜ in., 18 NPT, PD of 0.6218 to 0.6322 in.	Second group of two spindles.
17	Unloading Station and Inspection.	Tap two oil gallery holes, ⅜ in, 18 NPT, PD of 0.639 in. special.

Footburt drilling and tapping machine. The distance between each of these stations is 54 in. and there are three operating stations. The block is located at the first station top up, rear and forward. Table II shows the operations performed by this machine. Similar to following the other major machining operations, all the parts machined in this sequence are then checked and gaged.

Following the inspection, the engine block is conveyed to a Footburt two-way, 80-spindle, unit type, lead screw feed horiontal tapping machine where holes are tapped in the top and bottom surfaces. On the left hand horizontal head of this transfer type machine 40 spindles are mounted on a lead screw tapping unit 14 in. wide with steel ways, and are driven by a 15 hp, 1200 rpm motor. The block enters the machine with the valve side down and the rear end forward. In the top surface, the left hand head of the machine taps 38 cylinder head stud holes, 7/16 in., with a PD of 0.3984 to 0.4010 in., and taps the two generator pad holes, 5/16 in., with PD of 0.2764 to 0.2794 in.

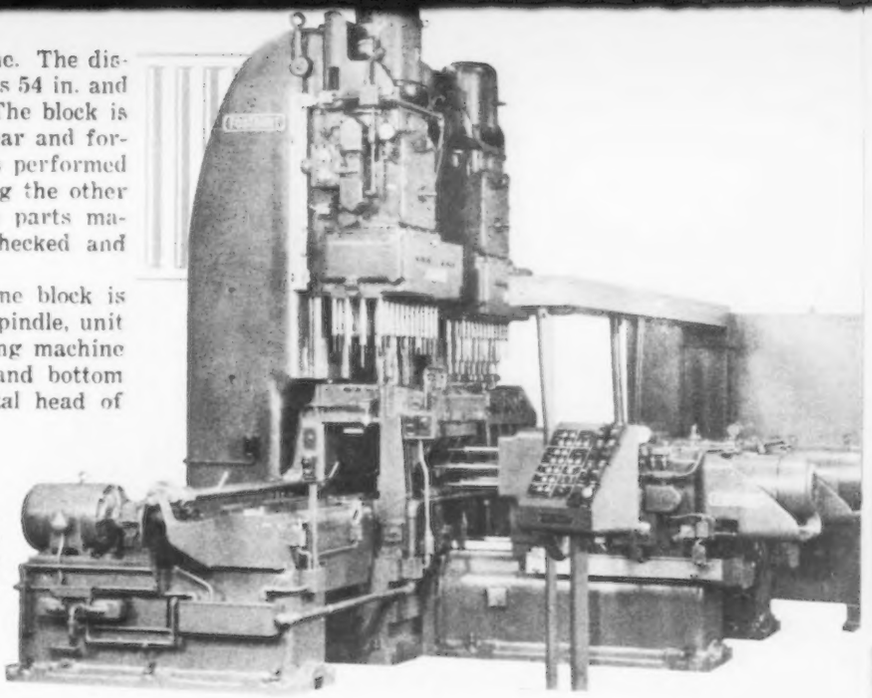


FIG. 8 - On this four-station, 124-spindle Footburt unit, holes are drilled for bearing cap bolts, pan rail studs, valve cover studs, oil drains, intake ports, manifold studs and the fuel pump pad.

The right hand head of the tapping machine has 40 spindles mounted on a lead screw tapping unit 14 in. wide with steel ways, driven by a 15 hp, 1200 rpm motor. This head taps in the bottom surface of the block 12 bearing cap bolt holes and 28 panrail holes. The bearing cap bolt taps are ½ in., 13 NC, No. 3 thread fit, with a PD of 0.4500 to 0.4537 in. The panrail hole taps are 5/16 in., 18 NC, No. 3 thread, with a PD of 0.2764 to 0.2794 in. These operations are then inspected.

This completes the machining operations on the block, following which the blocks continue by the roller conveyer table to the motor cylinder assembly. As noted, inspections are made after major machining operations, but there are no repair stations in the line. Repairs to the block are all made in the cylinder assembly line, where final inspections and gaging takes place. However, at this point all rough machining has been completed and much of the finished drilling and tapping has been completed.

In the cylinder assembly line, final machining on the block is accomplished, all dimensions are checked, cylinder bores are finished bored and honed, valve seats are chamfered, ground and checked, and all repairs of any nature are made. While, in this line, machining operations are fewer than in the machining line, they still are a vital phase of the line operation. Machining operations include: 35 drilling, 48 boring, 88 reaming, 34 spot-facing, 8 honing, 16 grinding, and 16 core drilling operations, plus others such as counterboring and chamfering.

As the engine block proceeds from the cylinder machining line to the cylinder assembly lines, the first operation is to blow out the bearing cap seats and stud holes and assemble the bearing caps to the block. This is done manually with portable tools, with the bottom of the block up and the front end forward.

The cam and crank holes are then bored on a ten-spindle Ingersoll boring machine and the No. 5 cam bearing is counterbored. Another ten-spindle Ingersoll boring machine semi-finish bores the cam and crank holes. These holes are then gaged, and the block moves to a three-station Ingersoll boring machine for finish-boring the cam and crank bores; facing and chamfering the center main bearing; chambering the cam bores on the front side; finish-boring the distributor and oil pump hole; reaming two 0.374 in. holes in the rear end of the block; and the oil seal and slinger grooves are cut.

At the first station, the center main bearings are faced and chamfered, and oil seal and oil slinger grooves are cut. The five cam bores are chamfered in the second station. The third station, a 14-spindle arrangement, finish-bores the cam and crank bores and the distributor and oil pump holes; reams two 0.374 in. ±0.005 in. holes in the rear end, and finish-counterbores the distributor hole. The cam and crank bearings are then gaged, the oil pump pad is checked for squareness with the oil pump shaft hole, the oil slinger grooves and the oil seal grooves are checked for depth, and various other required inspections are made.

Up to this point, all operations have been performed with the block in an overturned position, with the rear end forward. The block is then turned to an upright position, rear and forward, and moved to a 12-station Footburt valve-hole drilling machine.

This is a 97-spindle, unit type, hydraulic feed machine with seven of the 12 stations operating, and all work heads are to the right of the line. The distance between stations is 54 in., and each

TABLE II

Work Sequence and Operations on Six-Station, 120-Spindle Footburt Drilling and Tapping Machine
(Block Position: Top Up, Rear End Forward)

Station No.	Vertical Machine Head at Left (Top of Block)	Horizontal Machine Head to Right (Water Side of Block)
1	Loading Station	
2	Forty spindle arrangement mounted on hydraulic unit 16 in. wide; cast iron ways. Drive, 15 hp 1800 rpm motor	Ten spindle arrangement mounted on hydraulic unit 16 in. wide; steel ways. Drive, 15 hp, 1800 rpm motor.
2	OPERATION: Drill 38 cylinder stud holes 0.386 in. diam, and drill two holes in generator pad 0.261 in. diam.	OPERATION: Coredrill five core plug holes 1.918 in. diam; drill one water drain hole 21/64 in. diam; drill two holes for gearshift levers bracket 0.316 in. diam x 7/8 in. deep; and drill two holes partway for oil filter 21/64 in. diam.
3	Forty spindle arrangement mounted in hydraulic unit 16 in. wide; cast iron ways. Drive, 7½ hp, 1800 rpm motor.	Ten spindle arrangement mounted on hydraulic unit 16 in. wide; steel ways. Drive, ½ hp, 1800 rpm motor.
	OPERATION: Countersink 38 cylinder head stud holes 60°x15/32 in., ±1/64 in.; countersink two generator pad holes, 60°x11/32 in., ±1/64 in.	OPERATION: Ream five core plugs to 1.949 in., +0.000, —0.001 in. diam; countersink two gearshift levers bracket holes, 60°x13/32 in., ±1/64 in.; countersink water drain hole, 60°x7/16 in., ±1/64 in.; drill and countersink two oil filter holes, 60°x7/16 in., ±1/64 in.
4	Idle Station	
5	Fifteen spindle arrangement mounted on lead screw tapping unit 14 in. wide; steel ways. Drive, 7½ hp, 1200 rpm motor.	Five spindle arrangement, mounted on lead screw tapping unit 14 in. wide; steel ways. Drive, 3 hp, 1200 rpm motor.
	OPERATION: Tap eight manifold stud holes ⅜ in., 16 NC, No. 3 thread, PD of 0.3344 to 0.3377 in. Tap two fuel pump pad holes ⅜ in., 16 NC, No. 3 thread, PD of 0.3344 to 0.3377 in. Tap four valve cover bolt holes, 5/16 in., 18 NC, No. 3 thread, PD of 0.2764 to 0.2794 in.	OPERATION: Tap two gearshift levers bracket holes ⅜ in. diam x ¾ in. deep, 16 NC, No. 3 thread, PD of 0.3344 in. Tap one water drain hole ⅛ in., 27 NPT, PD of 0.3782 in. Tap two oil filter holes, ⅛ in., 27 NPT, PD of 0.3782 in.
6	Unloading Station	

operating fixture has cross as well as longitudinal feed movement. The pump for cross and longitudinal movements is driven by a 5 hp, 1200 rpm motor. All seven operating heads are mounted on a 16-in. wide hydraulic unit with cast iron ways. The operational sequence of this transfer-type machine is shown in table III and the machine is shown in fig. 9. Following the machining is the usual inspection, including the gaging and checking of angles and depths of intake and exhaust angular valve clearances, drilled hole diameters, alignment of valve guide holes and valve throat diameters. On the roller conveyer, the position of the block is again reversed to bring the bottom up and front end forward.

Two Ingersoll eight-spindle facing machines then spotface the 16 valve spring seats to 1.397 in. diam. Before passing to the next machine, a No. 00, RG Keller rotary grinder for grinding the edges at the bottom of the valve tappet bosses, the 16 valve spring seats are checked for depth and diameter and block is turned again to the top up, rear end forward position. After the grinding operations, bushings for the crank and cam bores are aligned, center distances of the cam and crank bores are checked; and the distance from the pump pad to the center line of the cam shaft, squareness of rear end with crank bore, alignment of valve guide and tappet holes, and the alignment of valve spring seats are checked. Also, the angle and depth of intake and exhaust angular valve clearances, the relation of valve guides and tappet holes with the centerline of the camshaft hole, and the alignment of intake and exhaust throat and guide holes are checked. Holes in the oil pump pad and the relation of the center main bearing face with locating holes are gaged.

Any repairs necessary to the block are made at this point. At this repair position, a 3½ ft American radial drill, a Cincinnati pedestal grinder, welding, soldering, and brazing equipment, electric and air-driven hand drills and other tools are available for such repair work. Taps, reamers, drills, and gages are also at hand. This operation is a vital one since it is the first repair operation and practically every machined point of engine block except the cylinder bores is examined and any repairs necessary are made.

As the block leaves this position, it moves to the cylinder bore repair station. The bores are examined carefully for sand holes which are drilled out and welded. Two Haskins ¼ hp bench grinders and a Weldrite arc welder are stationed here for such repairs.

With the block in an upright position, front end forward, it is delivered to the core plug assembly station. After this assembly, it is delivered to a 25-ton Oilgear press where the eight intake and eight exhaust valve stem guide bushings are pressed into place. The next operation is a finishing reaming of the intake and exhaust valve throats on an Ingersoll vertical machine.

Two Ingersoll vertical boring machines then semi-finish and finish-bore the cylinders, following which the block is washed in a pressure washing machine. Two water test fixtures then test coolant lines, and any leaks are repaired. The cylinder head stud holes are blown out, a sealing compound is applied, and the studs are driven by a Chicago pneumatic Hy-Cycle nut runner.

On two Barnes honing machines, Nos. 320 and 214, the cylinder bores are honed, following which is an inspection station, and then the block proceeds to a position on the line where

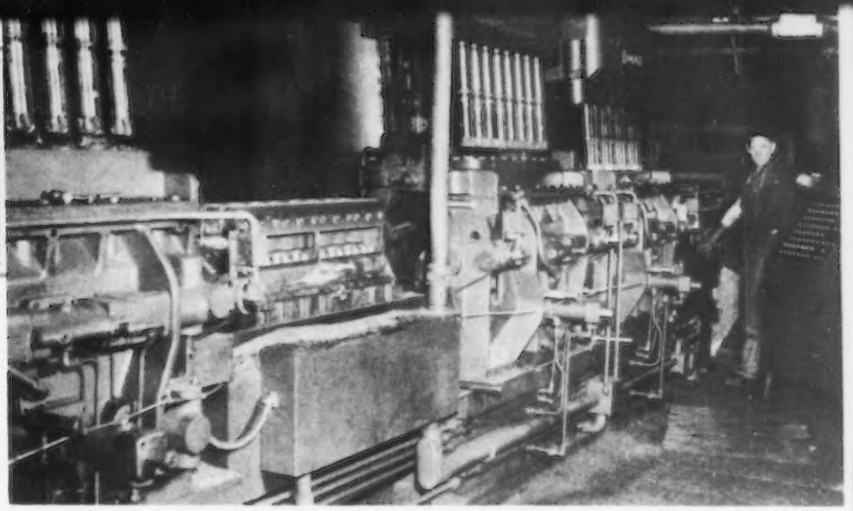


FIG. 9 - Shown here are the first three working stations on the 12-station Footburt. Individual operations on this machine are shown in Table III.

the pilots are assembled, intake and exhaust valves are seated by hand and the valve seat holes are blown out. Then, on a Sioux valve seat grinder, the eight intake and eight exhaust valve seats are ground. Intake valves seats are ground to an angle of 30° and the diameter of the seat is 1.640 in. The exhaust valve seats are at a 45° angle, and are 1.40 in. diam. These dimensions are then checked.

At a 6-ft bench, the next stop on the line, the pilots are pulled from the block and the top is washed and blown off. Then all points of the valve seats are checked for trueness, this time with indicator gages. Bluing gages check the accuracy of the seats. A Sheffield Precisionaire, double-column type, gage is also used in this inspection.

A 4-ft Cincinnati radial drill, a Cincinnati pedestal grinder, a Fuzon arc welder, hand drills and grinders and other such equipment are located at the next work position for making any necessary repairs on valves and spring holes and the valve seats.

A flow and pressure test station then checks oil lines, and cylinder bores and valve guide holes are gaged for squareness to the crankshaft bore, and for concentricity and diameter. This completes the cylinder assembly operations. The block is washed in a hot water detergent, rinsed in cold water and blown dry. When the blocks have to be stored, the cylinder bores are oiled. Otherwise, they proceed to final assembly.

The entire block machining and cylinder assembly lines, which are in reality a continuous line, are an example of the best use of transfer-type machining. Naturally, there may be some points where changes could be suggested, but the fact is that the line was carefully and completely designed to get the optimum benefit from all machining operations. At normal machinery efficiency, 50 blocks an hr are possible, and the line has operated at that speed. While the investment in such a machining setup is unquestionably one of major proportions, it is felt by the company that its production efficiency, plus the fact that it can be modified to handle future engine block design changes, will fully justify the expense.

TABLE III

Work Sequence and Operations on 12-Station, 97-Spindle Footburt Valve Hole Drilling Machine

Station No.	Operation
1	Load: Top surface up, valves side to left, rear end forward.
2	Upper angular head, 16 spindles, mounted on hydraulic unit 16 in. wide, cast iron ways. Drive, 20 hp 1800 rpm motor. OPERATION: Coredrill eight intake throats to 1-17/32 in. diam and eight exhaust throats to 1-9/32 in. diam.
3	Upper angular head, 8 spindles, mounted on hydraulic unit 16 in. wide; cast iron ways. Drive, 20 hp. 1800 rpm motor. OPERATION: Spotface four intake and four exhaust angular valve clearances. Intake seats, 1.844 in. diam and exhaust seats 1.562 in. diam.
4	Station idle.
5	Upper angular head, 18 spindles. Drive, 10 hp, 1800 rpm motor. OPERATION: Spotface four remaining intake and exhaust angular valve clearances.
6	Upper angular head, 17 spindles. Drive, 20 hp, 1800 rpm motor. OPERATION: Drill 16 valve guide holes, 39/64 in. diam, and drill one water circulating hole, 5/16 in. diam, same angle as valve holes.
7	Station idle.
8	Upper angular head, 16 spindles. Drive, 20 hp, 1800 rpm motor. OPERATION: Drill 16 valve tappet holes, 37/64 in. diam.
9	Upper angular head, 16 spindles. Drive, 7½ hp, 1800 rpm motor. OPERATION: Rough line ream 16 valve guide holes to 0.625 in. diam and 16 valve tappet holes to 0.609 in. diam.
10	Station idle.
11	Upper angular head, 16 spindles. Drive 7½ hp, 1800 rpm motor. OPERATION: Finish line ream 16 valve guide holes to 0.650 in. diam, ±0.0005 in., and 16 valve tappet holes to 0.6245 in. diam, ±0.0005 in.
12	Unloading station.

Foundry Convention

52nd annual AFA congress attracts visitors from U. S. and abroad . . . Strong interest shown in use of oxygen in cupola blast and in nodular cast iron . . . Wallis elected to head association for 1947-48.

FEATURING a large number of new and improved production tools and techniques, the 52nd annual meeting and equipment exhibition of the American Foundrymen's Assn., held in Philadelphia May 3 to 7, proved to be one of the most instructive and interesting meetings ever held by the association, according to opinions expressed by foundrymen attending the show.

The technical sessions, which included lecture courses, quizzes, round tables and symposia, covered a wide variety of casting problems including oxygen enriched cupola blast, nodular irons, quality control, sand control, melting techniques, job evaluation, refractories, casting defects, and nonferrous technology. A phase of foundry operation which was covered with especial thoroughness this year was the problem of engineering education for the foundry industry.

The annual Charles Edgar Hoyt lecture was delivered this year by C. E. Nelson, Dow Chemical Co., Midland, Mich., and was entitled "The Control of Grain Size in Magnesium Castings."

The annual business meeting saw the unanimous election of the following new officers, who will take office in July. William B. Wallis, president of Pittsburgh Lectromelt Furnace Corp., present vice-president of AFA, was named to head the society in 1948-49. Edwin W. Horlebein, president, Gibson & Kirk Co., Baltimore, who has been an international director of the association since 1945, will become vice-president of the association for the coming year.

Max Kuniansky, present AFA president, will serve as a director for one year following his retirement this July.

Elected to three-year international director-

AFA President, Max Kuniansky, vice-president, Lynchburg Foundry Co., Lynchburg, Va., who will retire from office in July.

AFA President-Elect, W.B. Wallis, president, Pittsburgh Lectromelt Furnace Corp., elected to head the association in 1948-49.

Director, Robert R. Gregg, foundry manager, Reliance Regulator Corp., Alhambra, Calif., re-elected a director.

Norman J. Dunbeck, vice-president, Eastern Clay Products, Inc., Jackson, Ohio, elected a director of AFA.

Thomas H. Benners, Jr., partner, T. H. Benners & Co., Birmingham, chosen to serve as an AFA director.

ships were Thomas H. Benners, Jr., managing partner, T. H. Benners & Co., Birmingham; Norman J. Dunbeck, vice-president, Eastern Clay Products Co., Jackson, Ohio; Alfred M. Fulton, vice-president, Northern Malleable Iron Co., St. Paul; Robert R. Gregg, foundry manager, Reliance Regulator Corp., Alhambra, Calif.; Victor E. Zang, vice-president, Unitcast Corp., Toledo.

Winners in the various divisions of the apprentice's patternmaking and molding contest also received their certificates and checks at the annual business meeting.

The annual banquet on Friday evening was highlighted by an address by Karl T. Compton, president, Massachusetts Institute of Technology. Dr. Compton's address was entitled "Team Play of Hand and Brain."

The banquet was also the occasion for annual presentation of AFA gold medals to three outstanding foundrymen in recognition of outstanding contributions to the advancement of the industry.

Egbert H. Ballard of Swampscott, Mass., received the William H. McFadden medal; R. G. McElwee, iron foundry division manager for Vanadium Corp. of America, Detroit, the John A. Penton medal, and Peter E. Rentschler, president-treasurer of Hamilton Foundry & Machine Co., the Peter L. Simpson medal.

Space limitations preclude extended discussions of all the technical papers presented at the various sessions although some notes on a few papers of general interest are presented herewith. Copies of various papers presented at the sessions may be obtained by writing the secretary, American Foundrymen's Assn., 222 West Adams Street, Chicago.

The foundry equipment and supplied exhibits this year were characterized by emphasis on mechanized production and quality control. The large number of full scale working exhibits proved to be especially instructive to the visiting foundrymen and were always packed with visitors. The consistently high quality and high interest catching rating of this year's exhibits inspired many visiting foundrymen to express the thought that the information and ideas developed through a trip through Convention Hall were extremely profitable.

Causes of Rat-Tails

A project which proved to be of particular interest to practical foundrymen at the meeting was the display and report on the causes of rat-tail casting defects. The report, presented by the committee on physical properties of molding materials at elevated temperatures, under the chairmanship of Harry W. Dietert, included a large display of actual cast specimens showing the effect of various conditions in causing rat-tails. The report itself was quite extensive and complete and illustrated the effect on rat-tails of such factors as casting thickness, pouring temperature, pouring time, mold hardness, compressive strength, moisture, grain fineness and distribution, cereal addition, combustible materials, bond type and natural sands.

The rat-tail phenomena were studied by making flat gray iron castings in a number of different sands. There were indications that pouring temperature of the metal, green strength and moisture content of the sand were not major causes of rat-tails. Since rat-tails occurred on light casting sections, it was inferred that sand does not have to be heated to a temperature higher than 1200°F to cause rat-tails.

Two sand properties appeared to be directly correlated to the tendency of a sand to produce rat-tails. These are expansion and hot strength at 1000°F. The sands which produced the rat-tail defect were said to have higher hot strength and higher expansion than the good molding sands.

Nodular Graphite Structure

Another meeting which attracted more than usual attention was the Friday session at which H. Morrogh of the British Cast Iron Research Assn. discussed various phases of the patented cast irons developed by the BCIRA. These irons, commonly referred to as nodular irons, are unalloyed in the general sense yet are reported to have physical properties substantially above the normal unalloyed gray iron. The paper did not contain much that had not been previously covered in earlier papers by the author in the British technical journals, although the extended discussion of the paper did develop a number of interesting points, including the fact that the BCIRA is working with some 40 foundries on this process.

Summing up the paper, Morrogh stated that a method had been developed for the production of nodular graphite structures in cast irons without the necessity for applying heat treatment as in the malleable cast iron process. The process in-

AFA President, Max Kuniansky, awarding certificates to this year's winners of the apprentice's molding and pattern making competition at the annual business meeting.

Andrew M. Fulton, vice-president, Northern Malleable Iron Co., St. Paul, elected an AFA director.

Victor E. Zang, vice-president, Unitcast Corp., Toledo, elected an AFA director.

volves the treatment of a low sulfur hypereutectic cast iron with cerium shortly before casting. The cerium is conveniently added as misch metal and functions first as a desulfurizer and second as a carbide stabilizer. With cerium treatment alone, only the hypereutectic graphite is nodular and the remainder of the graphite is in a new pattern referred to as "quasi-flake graphite." The hypereutectic nodules are of the spherulitic variety. Nodular cast irons with all of the graphite in the spherulitic form are obtained by treatment of the molten metal with cerium, followed by treatment with a graphitizing inoculant. The process can be applied to irons of a wide range of composition, and examples were given to illustrate the effects of some of the most important variables.

The discussion of Morrogh's paper brought forth the fact that considerable work has also been done in this country in the same direction. T. H. Wickenden, vice-president and manager of the development and research division of International Nickel Co., reported that Inco had also developed a process for producing spheroidal graphite structures in cast iron as cast. The addition used in this work was magnesium in the form of a nickel-magnesium alloy.

Oxygen Enriched Cupola Blast

ONE of the highlights of the gray iron sessions was the report "Oxygen Enriched Cupola Blasts," presented by W. C. Wick, associate metallurgist, Armour Research Foundation. The project, sponsored by Whiting Corp., explored the effect of varying oxygen enrichment on such factors as coke ratio, melting rate, iron temperature, lining damage, etc. Table I gives some comparative data on oxygen enriched blasts and normal heats.

The test runs were made in a No. 1 Whiting cupola, lined to 19 in. ID. A small Air Products oxygen generating unit was used as the source of high purity oxygen. The oxygen was bled into the blast from a bank of eight hydrotubes having a capacity equivalent to 32,000 free cu ft. The charges weighed 200 lb and consisted of 50 pct pig iron, 40 pct foundry returns and 10 pct steel flashings. Limestone was used as the fluxing agent and represented 32 pct by weight of the coke charge. As a matter of establishing a basis for comparison, two heats (Nos. 1 and 2 in table I) were made with normal oxygen content. Heat No. 2, table I, was considered to be an average operation for the test cupola with an 8:1 coke ratio and a normal volume air blast of 850 cu ft per min. The paper presented extensive data on the effect of variations in the control factors.

The conclusions drawn by the author from the experimental data were listed as follows: With approximately a 10 pct oxygen addition to the normal volume cupola blast and an 8:1 coke ratio, the melting rate was increased roughly 20 pct. Under these conditions the tapping temperature of the metal was approximately 100°F higher than with a normal oxygen content blast. Higher operating temperatures also provided less bridging and more fluid slag.

By control of the oxygen content and total volume of the blast, tapping temperature and melting rate for a given coke ratio can be controlled to suit the prevailing condition.

Oxygen additions of more than 10 pct of the total blast require a low coke ratio and would result in high tapping temperatures.

Temperature control by adjustment of the coke ratio is possible with oxygen-enriched blasts.

Operating conditions and tapping temperatures similar to a 5:1 coke ratio normal blast heat can be obtained by increasing the iron to coke ratio to 12:1 and adding from 8 to 9 pct of oxygen to the blast.

Reduced volume oxygen-enriched cupola blasts caused a smaller increase in melting rate and higher tapping temperature than the normal volume oxygen-enriched blast heats. This offers an additional tool for temperature and production control.

Periodic "shot in the arm" methods of using oxygen additions to the blast can be beneficial in obtaining hot iron on short notice without serious interruption of the charging routine.

Cupola heats that start to freeze up due to some operating difficulty (poor coke, bridging etc.), can be saved from dropping bottom by the emergency use of bottled oxygen added into the blast line. The temperature can be increased almost immediately and the heat saved.

TABLE I

Comparative Data, Normal and Oxygen Enriched Blast Heats

Heat No.	Melting Time (Min.)	Melting Rate (Lb per Hr)	Coke Ratio	Total Blast Volume (c.m)	Oxygen Addition (pct of Blast)	Level Off* Average Temp. (°F)	Metal Charged (Lb)	Metal Melted (Lb)	Metal Recovered (Lb)	Melting Loss (pct)	Increased Melting Rate (pct)	Remarks
2	115	2922	8-1	850	0	2675	5800	5600	5250	6.3	0	
3	113	3186	8-1	860	4.5	2700	6000	6000	5713	4.8	9.0	
4	100	3600	8-1	850	8.6	2775	6000	6000	5775	3.8	19.4	
6	82	4098	8-1	892	13.8		6000	5600	5596	0.07	40.2	Booster Charge of Coke Added During Heat—No Level Off
13	103	3096	8-1	700	9.9	2860	6000	5317	5191	2.3	5.9	
7	95	3789	12-1	817	8.2	2650	6000	6000	5825	2.9		
14	120	3200	12-1	550	8.1	2800	6400	6400	6362	0.6		
8	119	3000	7-1	850	8.7	2810	6000	5921	5835	1.5		
12	179	1836	5-1	850	0	2600	6000	5486	5389	1.6		
11	147	1956	5-1	850 750	0 8.0		4800	4800				Oxygen Used to Save Heat
15	104	3228	8-1	700 850 670	9.4 0 7.1	2790	5600	5600	5473	2.2	10.7	

* Level off tapping temperature is the average temperature obtained after the coke bed is burned down to the operating level and the temperature remains nearly uniform.

By proper manipulation and use of oxygen-enriched blasts, little additional refractory loss occurred and improved operating conditions resulted.

Less oxidation loss of the silicon occurred with the use of oxygen-enriched blasts.

Dollars and cents cost of oxygen additions will range from $0.25 to $20.00 per ton of melt depending upon quantity added and price paid per 100 cu ft.

Many operating men attending the session indicated particular interest in the possibility of using oxygen to save bad heats, rather than in its use as a continuous addition to the blast. The paper cited a particular case (heat No. 11 in table I) in which half way through the heat the temperature started to drop and severe bridging occurred. Under ordinary circumstances, it was said, it would have been necessary to drop the bottom on this heat. However, by enriching the blast by 8 pct when this bridging and temperature drop was noted, the temperature showed an immediate increase and the balance of the heat was run off without difficulty.

The author stressed that this case illustrated an important possibility which oxygen holds for the average foundry, particularly so since it requires no elaborate oxygen supply setup. A few cylinders would provide the oxygen needed in emergencies of this sort.

Another aspect of oxygen use stressed by Wick was its effectiveness in providing a means of temperature control. Using normal blast volumes, an oxygen addition of 8.6 pct was sufficient to increase metal temperature at the spout 100°F. On the other hand if the increase in temperature is not needed, enrichment would be effective in reducing the amount of coke required for melting a ton of metal. The author's comment on the effect of oxygen enrichment on the lining were also interesting. Summing up, he expressed the opinion that dimensionally speaking, the enriched blast can be considered less destructive to the lining than normal blast. However, the zone of maximum temperature is extended or elongated, which means the burned out area is increased accordingly. This condition accounts for the observed higher lining loss in enriched heats.

Fluidity Test for Aluminum

Further information on a standard test which measures the fluidity or mold filling capacity of aluminum casting alloys by checking the volume filled in a spiral test casting was given in a paper, "Fluidity Test for Aluminum Casting Alloys," by W. E. Sicha and R. C. Boehm, Aluminum Co. of America, Cleveland, presented at one of the aluminum and magnesium sessions.

An improvement in the test casting pattern, fig. 1, a 1/16-in. thick by 1¾-in. wide ribbon of a spiral shape molded in green sand and mounted on the drag face of a wooden match plate, which was proposed in the original AFA paper by L. W. Eastwood and L. W. Kempf, provides for a well in the drag directly under the sprue. This change produces more uniform conditions of flow into the spiral arms and has reportedly improved the consistency of test data.

Molding and pouring techniques were discussed and precautions to insure standardization were detailed. The same base molding sand or mix, with controlled moisture content, must be employed in all tests to give comparable results, as variations in properties of the molding sand have been found to materially affect fluidity data.

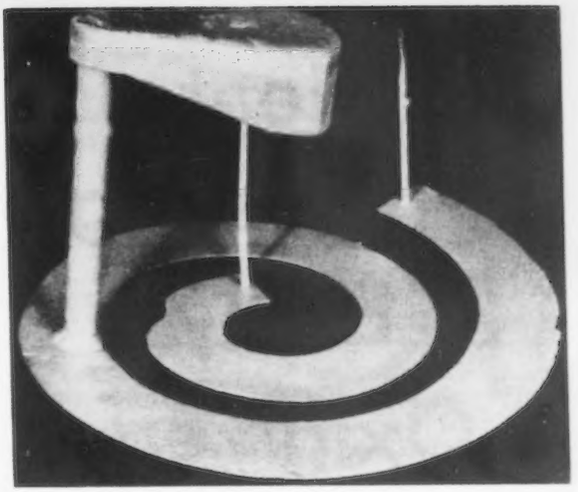


FIG. 1 - Original design of the flat spiral test casting for determining aluminum alloy fluidity. The standard mold design being used now provides a well at the base of the sprue to insure uniform flow into the spiral arms.

Deviations from the standard pouring temperature, arbitrarily 135°F for aluminum alloys, of more than ±5° will alter spiral arm volumes or weights seriously. In fact, pouring temperature control is critical to the extent that as pouring temperature is approached, very gradual heating of the alloy in the crucible is necessary so that the alloy will neither be heated nor cooled as it is poured over the crucible lip.

The discussion period indicated considerable interest in the establishment of such a standard fluidity test and exact specifications for mold production were offered by the authors in order that additional data can be gathered by other investigators over the next year and reported at the next AFA meeting.

Welding Carbon Steel Castings

Lime or mineral coated welding electrodes in contrast to organic coated rods, have been found to produce welds free from pinhole porosity in plain carbon steel castings according to a paper by E. LaGrelius and J. D. Wozny, Research Metallurgists, American Steel Foundries, East Chicago, given at one of the steel sessions.

The investigation was to develop techniques for producing welds possessing the minimum physical properties demanded in plain carbon steel castings and to study the metallurgical effects of weld size, section size welded and subsequent heat treatments from the standpoints of hardness and microstructure.

Organic coated electrodes were generally found to be unsuited for repair welding of plain carbon steel castings because of a tendency to produce pinhole porosity. But lime and mineral coated rods were for the most part successful in this application, and a number of electrodes were developed to meet the minimum required physical properties of plain carbon steel.

Heat Processing Easily Oxidized Metals

Certain metals, including high chrome irons, nickel chrome alloys and 18-8 stainless steels, are very active towards oxygen, water vapor and nitrogen, and are therefore difficult to furnace braze without the use of flux, and to bright anneal. A technique for purifying and applying hydrogen atmosphere for furnace brazing, bright annealing and sintering metals easily oxidized in reducing atmosphere furnaces is discussed herein. The author describes the construction of several laboratory and commercial units and indicates various types of assemblies that can be satisfactorily processed.

By F. C. KELLEY
Research Laboratory, General Electric Co., Schenectady

THE recent war created a demand for the joining of many different materials such as high chrome irons, 80-20 Ni-Cr, and 18-8 stainless steel alloys, without the use of flux. A demand also existed for a method of bright annealing these materials. In many cases they could not be brazed with copper without flux by furnace-brazing; fluxes had to be used because the atmospheres of the furnaces caused oxidation of the materials. As a result, techniques were developed whereby such metals could be copper brazed without flux, or be bright annealed.

One technique that has proved successful in purifying and utilizing hydrogen atmosphere for brazing metals that are active towards oxygen, water vapor and nitrogen, is described in this article.

The above metals are often used in high voltage vacuum tubes, where gases may be liberated during exhaust and operation, because of the presence of unremoved flux and undesirable gases held by the metals. Since this makes exhaust difficult, or results in failure during operation, furnace brazing of such assemblies without flux and bright annealing has distinct advantages.

The elements which cause most trouble are aluminum, chromium, manganese, silicon and titanium. Alloys containing small amounts of these elements can be brazed in commercial furnaces without flux, but when present in large amounts, they usually require flux. However, high chromium and high manganese alloys are easily brazed without flux, and bright annealed, in pure dry hydrogen, by using the technique to be described.

The use of brazing fluxes results in a large number of flux inclusions, voids, leaks and rejects. In many cases where satisfactory joints are obtained by the use of fluxes, the cost of cleaning to remove the flux deposits and oxides is excessive and slows production. Brazing in pure dry hydrogen without the flux gives joints which are free from flux inclusions, relatively sound and tight and uniformly strong. The cost and time consumed for cleaning are eliminated because the materials are bright and clean. Bright annealing in pure dry hydrogen also affords similar advantages, and eliminates grease, gases and oxides.

Typical materials treated in pure dry hydrogen are: Nonmagnetic 18-8 stainless steel parts for electron microscopes and million volt X-ray tubes, bright annealed and copper brazed; Fernico to 18-8 assemblies, copper brazed; parts made of 80-20 Ni-Cr or alloy, bright annealed; tungsten contacts to 18-8 or high chrome iron electrodes for ignition systems, copper brazed; Stellite to

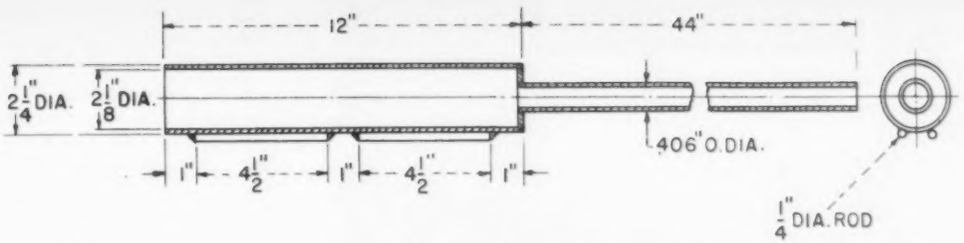


FIG. 1 - Sketch of an iron tube used for manufacturing pure dry hydrogen.

12 Cr steel buckets, copper brazed and silver brazed; syphons of 18-8 to other stainless steel parts, copper brazed; many 18-8 and high chrome iron parts, bright annealed; 18-8 parts for mercury vapor pumps, brazed with a new alloy of 80-20, Ni-Mn which is not attacked by mercury (this alloy is much more easily oxidized than the stainless steels and much more difficult to reduce even in pure dry hydrogen); extruded 18-8 and modified high chromium iron welding rods made from metal powders, sintered; beryllium copper alloys, heat treated; beryllium compacts for special types of X-ray tubes, sintered and silver brazed; magnetic materials such as silicon steel, silicon nicaloi (45 Ni, 3 Si, bal. Fe), mu metal (71-76 Ni, 4½-6 Cu, bal. Fe) and the like, annealed in pure dry hydrogen to secure the best magnetic properties; and Stellite liners to stainless steel cylinders for pumps, copper brazed.

Pure titanium hydride when painted on a ceramic tube and heated in pure dry hydrogen to 1830° to 2010° F. reacts with the ceramic and leaves a firmly-adherent coating of titanium on the ceramic. Metal caps have been copper brazed or silver brazed to the ends of these coated ceramic tubes giving vacuum tight joints. However, titanium alloys of iron that are melted by commercial processes give trouble. The titanium in solution in the iron reacts with nitrogen and oxygen in the air during melting. It has been impossible thus far to successfully braze these alloys containing appreciable amounts of titanium nitrides and oxides, even in pure dry hydrogen. Aluminum-iron and silicon-iron alloys containing as much as 3 pct of either element also give considerable trouble even with pure dry hydrogen. The reason for this is probably due to the fact that these elements held in solid solution in the iron are partially nitrided and oxidized during production.

It has been the opinion of men experienced in the brazing field that many of the foregoing materials could not be furnace brazed commercially without a flux. This, however, has been disproved. Commercial furnaces and commercial apparatus for purification of hydrogen have been used in this work and serve to demonstrate the commercial possibilities. The demand for these materials is an ever increasing one. If those interested in these materials realized the possibilities it would not be long before there would be many new products on the market.

Many have tried brazing the metals listed above in conventional types of atmosphere-controlled industrial furnaces and have met with failure. The

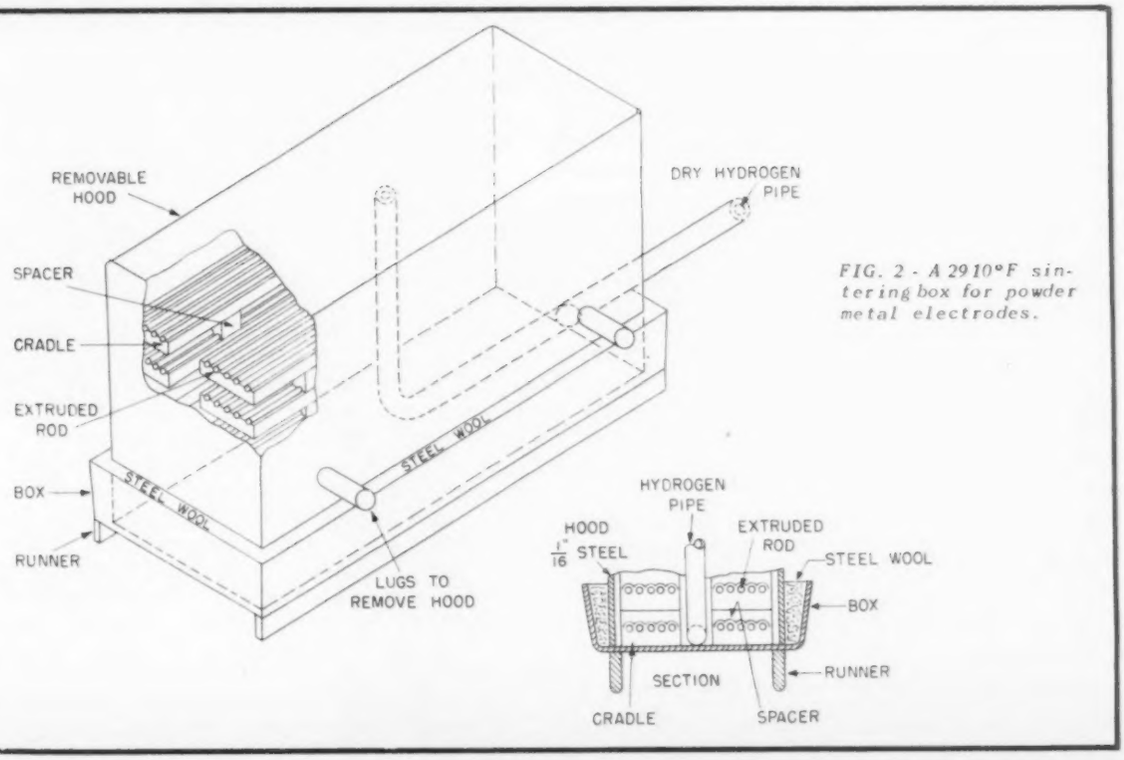


FIG. 2 - A 2910°F sintering box for powder metal electrodes.

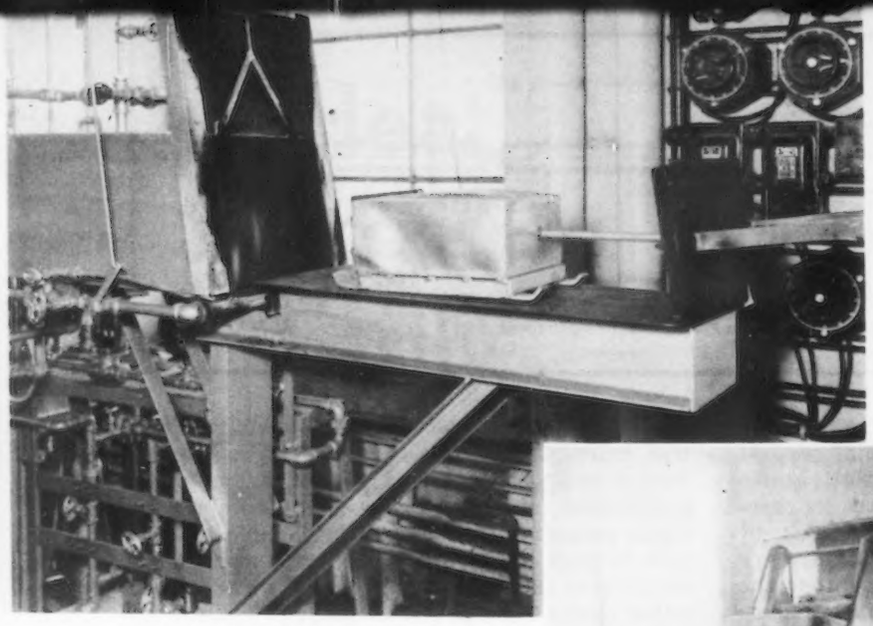


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FIG. 3 - A retort ready for introduction into the cooling chamber of a brazing furnace. The closed gate to the cooling chamber can be seen immediately in front of the retort.

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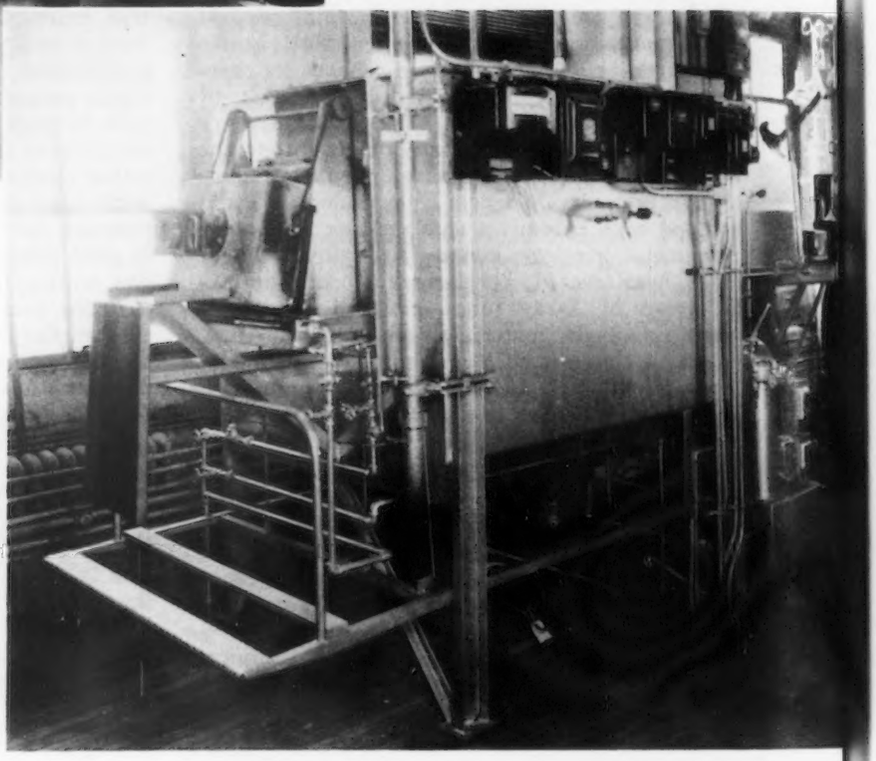

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FIG. 4 - Front view of the furnace shown in fig. 3. This furnace is operated at 2100°F.

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reason for these failures has been the impossibility of maintaining an atmosphere with sufficiently low partial pressures of oxygen, water vapor and in some cases nitrogen, in present day furnaces.

The success of the newly-developed furnace brazing technique depends upon the maintenance of an atmosphere capable of reducing chromic oxide (Cr_2O_3) and manganese dioxide (MnO_2) This is made possible by the utilization of a closed retort or container, provided with an inlet for pure dry hydrogen and a vent, or outlet, to allow the escape of any reaction products such as water vapor.

The presence of even very small amounts of water-vapor defeats the process because low partial pressures of water vapor or oxygen result in an oxidizing atmosphere and the surfaces to be brazed are then not wet by the brazing materials. Renewal of the atmosphere within the retort washes out any water vapor formed through reactions during brazing, and maintains the low partial pressure of the detrimental gases. Best results are obtained when the dewpoint of the hydrogen is −100° F or lower. The retort can be of low carbon steel, heat resisting alloy or any other suitable material which has been freed of oxides, grease and dirt by chemical cleaning, hydrogen reduction or grit blasting. The shape and size of the retort can be designed to fit the job.

A laboratory furnace installation contains a heating chamber and a cooling chamber with a gate between them. The heating chamber consists of a cylindrical alundum tube wound with a molybdenum wire heating unit contained in a suitable metal case filled with alumina. The cooling chamber consists of two concentric steel tubes between which water flows for cooling the work.

The retort shown in fig. 1, into which the work is placed, consists of an iron tube closed at one end and provided with a long hydrogen inlet tube at the other end. The retort is inserted in the cooling chamber while the gate is closed. A split rubber stopper, with a hole provided to take the hydrogen inlet tube, is inserted in the end of the cooling chamber. The inlet tube is connected to a source of pure dry hydrogen and the retort is purged while in the cooling chamber. The gate is then opened and the retort pushed into the heating chamber, held for the desired time, and then pulled into the cooling chamber and left until cold. It is

then removed.

Retorts such as this generally consist of iron tubes 2 to 3½ in. in diam. and 12 to 36 in. long. They are provided with runners to support them from contact with the wall of the furnace so they do not overheat locally. The runners assist in the ease of manipulation when the retorts are pushed into the heating chamber or pulled into the cooling chamber. The retort is closed after loading by wiring a cover of 0.002-in. sheet iron over the open end.

A retort suitable for sintering 18-8 welding rods is shown in fig. 2. It will be noted that the bottom tray carries runners as well as the hydrogen inlet tube. Grooved-metal boats are filled with extruded rods and are stacked one above the other on the tray, separated by means of metal supports or spacers. The cover is placed over the loaded tray and the space between the upturned edge of the tray and cover is filled with alumina (Al_2O_3) powder, steel wool, alumina + ferrochrome powder, alumina + chrome, or the like, to seal the chamber. Such porous fillers furnish a means of escape for the hydrogen from the retort and prevent diffusion of the furnace atmosphere back into the retort.

In order to prevent oxidation of the charge within the retort if diffusion should occur at some stage (for instance, when the charge is pulled from the hot furnace into the cooling chamber), the chrome or ferrochrome in the mixtures with alumina will clean up the gas on the way to the inner chamber. The hydrogen flow may also be increased to prevent this diffusion.

Fig. 3 illustrates another similar retort ready for introduction into the cooling chamber. The stopper for the cooling chamber is a rectangular piece of asbestos board bolted to a metal plate. A hole is drilled through the assembly to take the hydrogen inlet tube to the retort. The retort is of ⅛-in. sheet iron mounted on an angle iron frame with runners, and is closed by spot welding a sheet of 0.002-in. iron over the front.

The furnace shown is a small box-type commercial furnace with molybdenum heating elements. The closed gate to the cooling chamber can be seen immediately in front of the retort. The pure dry hydrogen supply is connected to the hydrogen inlet tube of the retort and the retort is thoroughly washed out. Since the cover is not gas tight, it allows some leakage. Sometimes a small hole is pushed through the 0.002-in. iron near the bottom of the retort to allow for renewal of the atmosphere within it. When the retort is filled with pure dry hydrogen, the gate (provided with a gas curtain) is raised and the retort is pushed into the cooling chamber. The asbestos stopper is slipped into place under the open gate and the retort is then pushed into the heating chamber.

Fig. 4 reveals a front view of the furnace. Pure dry hydrogen for the retort is obtained by passing unpurified hydrogen through a tower filled with palladium-coated ceramic and then through a tower of activated alumina. The tower of activated alumina can be seen supported on a stand at the back corner of the furnace.

This furnace is operated at 2100°F. and the retort is left in the heating chamber long enough to copper braze the assemblies. At the end of this time the retort is pulled back into the cooling chamber and allowed to cool. After the retort has been purged with nitrogen to prevent any possibility of explosion, the asbestos stopper is removed by the rectangular handle attached to it, the retort withdrawn from the cooling chamber, and the gate to the cooling chamber dropped into place.

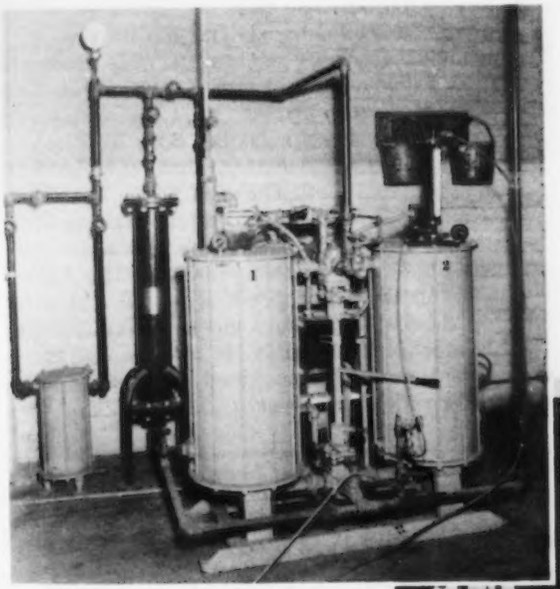

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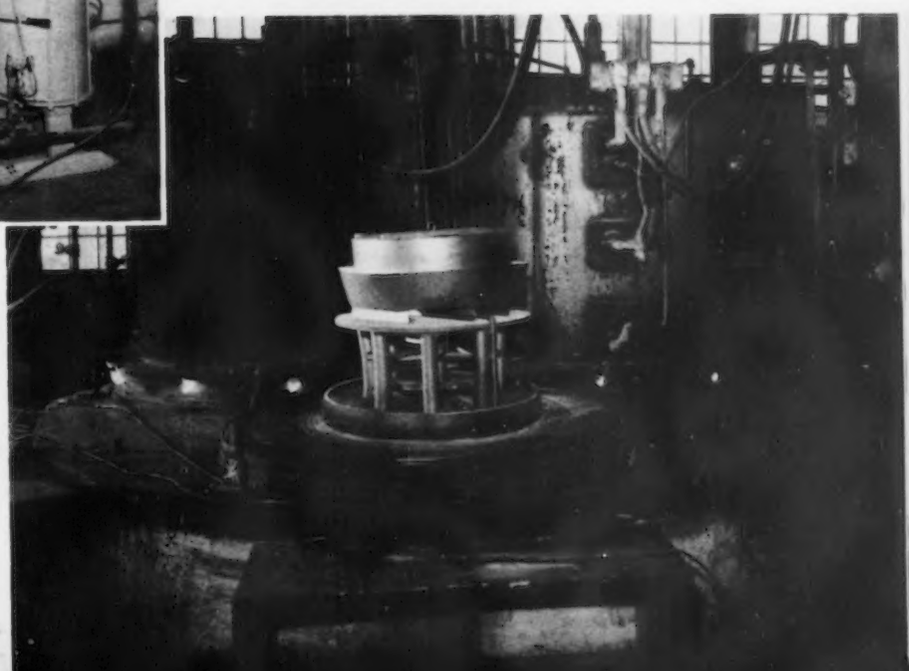
FIG. 5 - A hydrogen purification system. At the left is shown a small tower, or oil trap, to remove any oil that might be carried by the unpurified hydrogen.

LEFT.

FIG. 6 - A three-stage brazing furnace. In the foreground is located a loading stand on which the retort for pure dry hydrogen is placed.



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rectly on the bottom of the tray, previously covered with a thin layer of alumina powder. The powder prevents parts from being brazed to the tray in case the brazing material runs to the area which otherwise might be in contact with the tray.

The space between the inner ring and the upturned side of the tray is filled with alumina powder. Since the cylindrical retort cover has a diameter between that of the inner ring and the outside of the tray, it can be dropped into the alumina and forced down through until it makes contact with the bottom of the tray. Pure dry hydrogen is connected to the inlet pipe of the retort through a flexible metal tube.

The retort is washed out with 50 cu ft. of pure dry hydrogen per hour. Samples of the gas from the outlet tube of the retort are caught in a test tube and ignited to make sure the atmosphere within the retort is not explosive. The retort may also be washed out with nitrogen or some inert gas before the pure dry hydrogen is connected to it.

The heating chamber and cooling chamber are both elevated vertically by means of hydraulic pressure and the turntable upon which the loading stand rests is revolved counter-clockwise until the loading stand is directly under the heating bell. The heating and cooling chamber bells are then lowered quickly into place. Gas flames burn at the bases of both the heating and cooling chamber bells, and ignite the hydrogen coming from the bells. This prevents explosions from occurring due to hydrogen exhausting into the building, or air mixing with the hydrogen, in either of the bells when elevated. When the bells are raised the ignited hydrogen burns quietly. The mouths of the bells are sealed by steel shot when lowered.

The furnace temperature is 1290° to 1650°F. when the retort is introduced into it. The furnace temperature is then raised to about 2120°F., held at temperature for about 1 hr., then lowered again to 1290° to 1650°F. and the shift of the charge is made into the cooling chamber.

The three-stage furnace makes commercial operation continuous. While the one stage is being loaded, another can be in the heating chamber, and the third in the cooling chamber. The size of the retort can be made to fit the job, provided it is not too large for the furnace. A much larger retort has been used in the three-stage furnace than is shown in fig. 6. High chrome alloys copper brazed in the retort of this furnace come out attractively bright and shiny.

The high chrome steels always oxidize during heating through the temperature range of about 1290° to 1560°F. and clean up very slowly at 1560°F. They clean up more rapidly at higher temperatures. This is very important in bright annealing operations.

Furnaces of large commercial type are being built to give temperatures as high as 2550°F. for this class of work. Sometimes these high-temperature furnaces are necessary or desirable. For example, there are good brazing alloys that melt at temperatures above 2120°F. The steeper the temperature gradient that can be maintained between the charge and furnace, with a furnace capable of operation up to 2550°F., the more rapid is the transfer of heat through the retort to the charge. This reduces the time required to heat the charge through the critical oxidation range and limits the amount of oxidation, and consequently the time required to reduce this oxide at the higher temperatures is less. Hydrogen activity increases with the increase in temperature and 2190°F. seems to be a very useful temperature for bright annealing.

Special brazing alloys have been developed to give high physical properties or some specific property which makes them desirable. Examples of the former are 85-10-5, Cu-Ni-Fe, and 97-3, Cu-Co, requiring furnace temperatures of about 2280°F.[1]; and of the latter 80 Ni-20 Mn requiring 2415° to 2460°F. This nickel-manganese alloy is not attacked by mercury, and therefore is useful in furnace brazing mercury pumps made of 18-8 stainless steel. Its melting point is about 2325°F.

A mercury vapor pump component of 18-8 steel brazed in pure dry hydrogen, using the nickel-manganese brazing alloy, is shown in fig. 7. Note the clean fillet around the tube extending through the top punching. The portion shown is of the boiler with the exhaust and return nozzles.

A complex assembly of 18-8 parts is shown in fig. 8; (A) shown one side and (B) the other. This assembly is copper brazed. Note the concentric rings filled with small holes in (B).

Another complex assembly, shown in fig. 9, is also made of 18-8 steel. The view at the left shows the copper wires at the joints before brazing while the one on the right shows the assembly after brazing. Note the lighter shade of the brazed assembly on the right. This is actual, for after brazing, 18-8 steel appears much whiter than the freshly-machined assembly. It may be due to recrystallization of the machined surface resulting in greater reflective power.

[1] *Floyd C. Kelley, "Properties of Brazed 12 Pct Chrome Steels," THE IRON AGE, Nov. 2 and 9, 1939.*

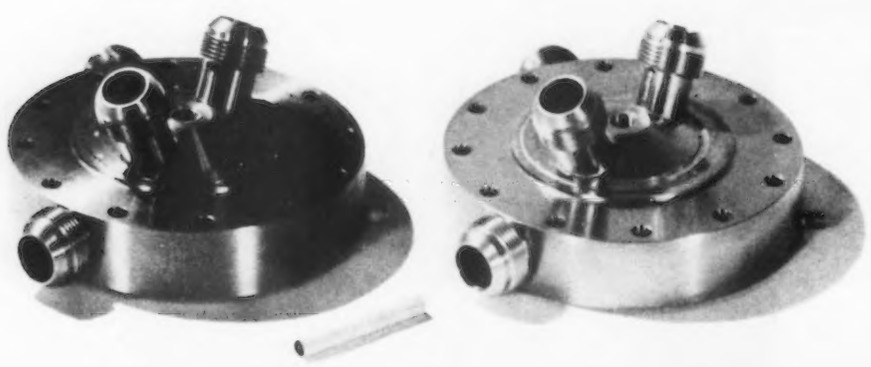

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FIG. 9 - Another complex assembly manufactured from 18-8 steel. The view at left shows the copper wires at the joints before brazing while the one on the right shows the assembly after brazing.

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lyst. The gas, after passing through the trap, goes through the next tower (to the right) containing palladium catalyst, which serves to combine the oxygen present with hydrogen at room temperature, to form water. After passing through this tower, the gas flows through one of the two activated alumina towers (shown at the right) where the moisture in the hydrogen is removed. The resulting hydrogen has a dewpoint of —100° F. or lower. The pure dry hydrogen line is shown connected to a valve located at the left of activated alumina tower No. 2, near the bottom. A flexible metal tube carries the gas to a flowmeter resting on the top of tower 2. The outlet from this flowmeter is connected directly to the retort on the loading stand (shown in fig. 6) by means of a long flexible metal tube.

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LEFT

FIG. 7 - A mercury vapor pump component of 18-8 steel, brazed in pure dry hydrogen using a 80 Ni-20 Mn brazing alloy.

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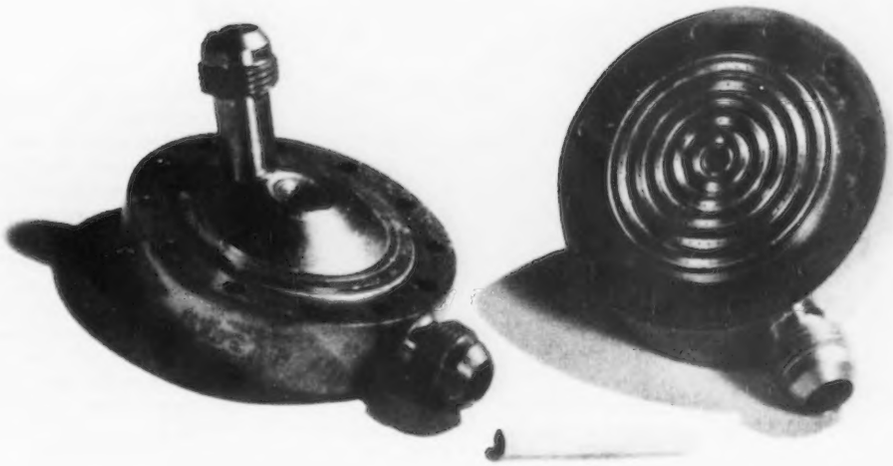
FIG. 8 - A complex assembly of 18-8 parts. (A) shows one side of the assembly and (B) the other. This assembly is copper brazed.



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Another commercial setup on a larger scale is illustrated in figs. 5 and 6. Fig. 5 shows the hydrogen purification system, and fig. 6 a three-stage furnace, in the foreground of which is a loading stand on which the retort for pure dry hydrogen is placed. At the right and in back of the retort is the bell type heating chamber, while at the left is the cooling chamber. The large circular base on which the loading stand and bells rest is a turntable.

At the left (of fig. 5) is a small tower, or oil trap, to remove any oil that might be carried by the unpurified hydrogen. No oil is permissible, for it destroys the catalyst in the palladium tower. The presence of chlorine will also poison the catalyst. The gas, after passing through the trap, goes through the next tower (to the right) containing palladium catalyst, which serves to combine the oxygen present with hydrogen at room temperature, to form water. After passing through this tower, the gas flows through one of the two activated alumina towers (shown at the right) where the moisture in the hydrogen is removed. The resulting hydrogen has a dewpoint of —100° F. or lower. The pure dry hydrogen line is shown connected to a valve located at the left of activated alumina tower No. 2, near the bottom. A flexible metal tube carries the gas to a flowmeter resting on the top of tower 2. The outlet from this flowmeter is connected directly to the retort on the loading stand (shown in fig. 6) by means of a long flexible metal tube.

The retort in this case consists of a lower tray and cover made of sheet iron. There is a ring several inches high welded inside and to the bottom of the flanged tray. The space between the inner ring and the flange of the tray provides a reservoir for powdered alumina, which serves as a seal for the retort. Inlet and outlet tubes are welded to the bottom of the tray.

The outlet, not visible in fig. 6, is used for checking purity of the gas during the purifying period, and exhausts gas into the furnace during the brazing cycle. The charge to be brazed is assembled inside the inner ring of the tray. It may be elevated from the bottom of the tray, by heat resisting alloy supports, or it may be placed di-

Casting Lead Parts in

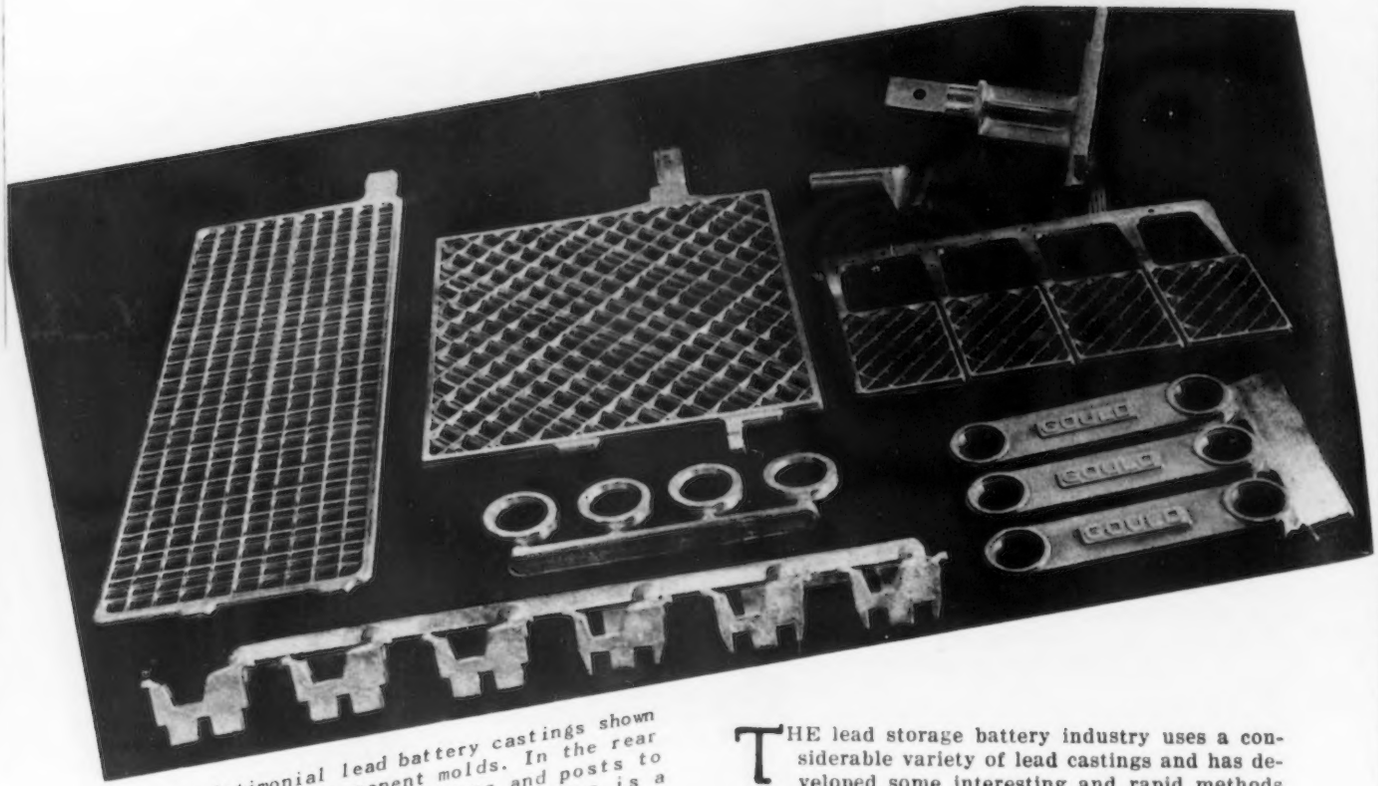

FIG. 1 - Antimonial lead battery castings shown were produced in permanent molds. In the rear are three grids and the straps and posts to which grids are burned. In the center is a gate of seal rings. In the right foreground is a gate of three intercell connectors, and at the lower left is a gate of telephone battery straps.

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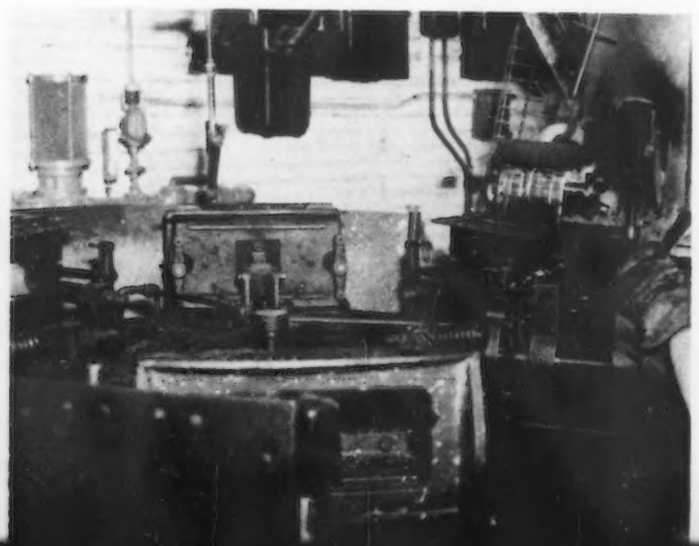
FIG. 2 - Semiautomatic machine for quantity casting of battery grids has six permanent molds on a motor driven turntable. Molds are opened and closed and castings are ejected by cam action. Pouring is from a trough, seen at the right, which is tilted by a cam mechanism to deliver a metered amount of metal.



THE lead storage battery industry uses a considerable variety of lead castings and has developed some interesting and rapid methods using permanent molds with automatic and semiautomatic machines to produce these items.

Gould Storage Battery Corp., Trenton, N. J., casts in antimonial lead three sizes of grids, straps, posts, sealing rings and other items weighing from 0.2 to 23 lbs. As the variety of these castings, some of which are shown in fig. 1, would indicate, a number of casting methods and permanent mold techniques are being used at Gould.

For quantity production of grid castings and other parts a semiautomatic machine, shown in fig. 2, is used. This machine has six molds mounted on a common turntable that is motor driven through a reducer at approximately 3 rpm. Motion of the table is continuous and is adjusted so that after turning through an angle of 60° one mold is directly under the filling trough. As the mold comes into position the filling trough is automatically tilted for pouring by a cam and lever arrangement in which the cam is adjusted so as to feed the correct amount of metal to fill the mold. When the metered amount has been delivered the trough is returned to a level position until the table turns through another 60° to position another mold for filling.

These machines are capable of making about 550 casts per hr., but since many molds contain multiple cavities the number of individual castings is correspondingly increased. Molds normally make from 1 to 4 castings each.

Filling of the pouring trough on the machine is accomplished by a pump that discharges continuously through an elbow above the trough. The pump has more than enough capacity to keep the trough filled and any excess metal overflows back into the melting pot above which the trough is supported.

Permanent Molds

By HERBERT CHASE

Rapid quantity production of lead castings has proved essential to efficient operation in the lead storage battery industry. This article describes the permanent molds, the semi-automatic casting machines and the techniques used for production of battery castings weighing up to 23 lbs. by a major battery producer. The antimony-lead alloys used for different parts are discussed.

In the production cycle using these machines, the molds are normally handled and passed along after pouring for a sufficient period of time to allow freezing of the metal before the position where the mold is opened automatically by a cam is reached. As the mold opens, ejector pins are advanced to push the casting free of the mold recesses. Castings are caught by an operator who inspects and stacks them for transfer to trimming machines where runners are cut at gates and any flash is trimmed. Excess metal, including that which fills the pouring slot and corresponds to a sprue, is returned to pots where it will be remelted along with fresh metal ingots.

Pouring is done with the metal at about 900° F and at such a rate as to fill the mold rapidly enough to prevent sections at the top from freezing before those below are filled. To avoid too rapid chilling and to prevent sticking to the molds, the latter are kept coated with a carbon deposit from the smoke of an acetylene flame or by spraying with a wash that contains cork. Each of these produces a heat insulating film on the surfaces of the mold cavities which prevents too rapid flow of heat into the mold.

Operators of these semiautomatic machines see that molds are kept properly coated, keep the melting pot supplied with lead, and remove and inspect castings upon ejection from molds. After castings are removed, molds are advanced, closed and locked automatically, and are then continued around to the filling station to complete the cycle.

Grids of large or odd sizes and many other castings not needed in sufficient quantity to warrant automatic machines are cast in hand machines, one of which is shown in fig. 3. In such machines, the mold is closed and locked by a hand lever and toggle, and after the metal is poured from a hand ladle and has frozen, the mold is opened by lifting the toggle lever so that the casting can be removed.

For very large grids, weighing as much as 23 lb, the mold is operated with a screw rotated by a capstan wheel, as in fig. 4. Two men do the pouring in order to fill the mold as rapidly as required. Molds of this size have only a single cavity and because of large size and weight generally require two men to handle the castings readily.

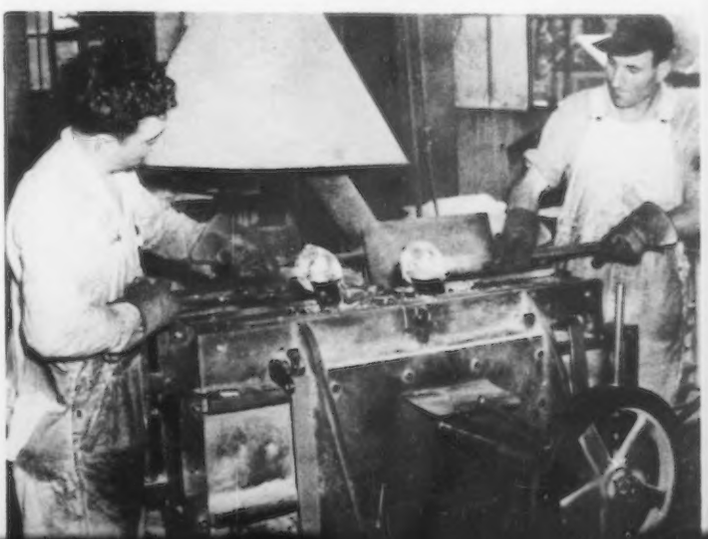
The lead alloys employed at Gould contain from 4 to 10 pct Sb. Positive grids for large stationary batteries contain 4 pct, positive grids for motive power batteries and negative grids of all types as well as straps and connector castings contain 7 pct, and locknuts and special castings have 10 pct Sb.

ABOVE

FIG. 3 - Small hand operated mold for casting grids similar to those stacked at the left has the operating toggle controlled by a hand lever.

BELOW

FIG. 4 - Two operators are shown pouring into mold used in casting 23 lb grids. Capstan wheel in the right foreground rotates a screw for locking and opening the mold.



Sheet Leveler Incorporates New Feature

A sheet leveler incorporating a solid platen backup instead of conventional backup rolls and an endless chain roll drive is described in this article. Used during the war for flattening silver chloride, General Electric now uses this type on a production basis to flatten sheet steel for refrigerator cabinets.

By THOMAS E. LLOYD
Machinery Editor,
THE IRON AGE

DESIGNED during the war for a special job, the Voss-United chain type roller leveler is now being used for the first time on a production job. At the Erie, Pa., refrigerator plant of General Electric Co., this machine is being used for leveling steel sheets on three 7½-hr shifts a day, or a total of 22½ hr out of every 24 hr period, supplying the flattened steel sheet requirements of three refrigerator cabinet production lines.

Sheets rolled vary from 14 to 16 ft in length and from 0.036 to 0.048 in. in thickness, depending upon the model of the cabinet being manufactured. The sheet steel is rolled approximately 2 to 4 hr prior to the bending, folding and fabricating operations. If the sheets are not put into production after the elapse of approximately six hours they are rerolled. This latter practice would not be normal procedure if sheet quality and grade were consistent, but under present market conditions it is necessary to obtain sheet steel where possible and this extraordinary practice assures end product quality.

The purpose of the roller leveler is to stress relieves and flatten the sheets by flexing, thus making the steel more pliable for folding and bending. Prior to the installation of this unit, difficulties were encountered, including variations in bend radii and a looseness in the metal sides of the case. The use of the Voss-United machine has largely eliminated these conditions.

The new roller leveler, patented and built by the Voss Machinery Co., Pittsburgh, is designed to flatten mild steel sheets having a medium yield point of 35,000 psi: a thickness range of 0.025 to 0.075 in.; and in widths up to 28 in. The mill is readily reversible and can be operated with equal efficiency in either direction at a straightening speed from 75 to 300 fpm.

Endeavoring to improve upon the conventional style of leveler and especially to provide a continuous means for backing up small diameter rolls, the new unit has incorporated into it a continuous roll backing up support extending the full length of the roll. This construction is shown in fig. 1. This back-up is in the form of a chilled cast alloy iron platen with ground surfaces hardened in proportion to the hardness of the leveling rolls. This eliminates the possibility of rapid wear, and through this technique of backing up the rolls, deflection is reduced to a minimum. A strip of flexible felt is applied to each end of each platen so that starting inertia

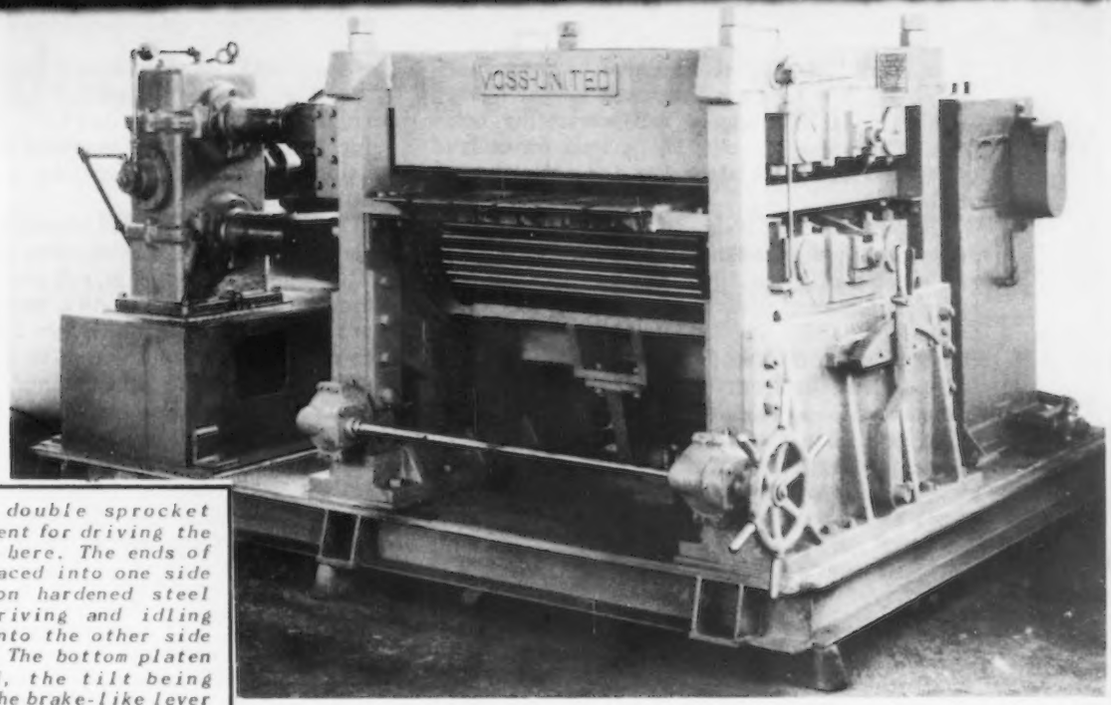


FIG. 2 - The double sprocket chain arrangement for driving the rolls is shown here. The ends of the rolls are laced into one side of each chain on hardened steel pins and the driving and idling sprockets fit into the other side of each chain. The bottom platen can be tilted, the tilt being controlled by the brake-like lever to the right of the machine.

of the roll will be overcome before the work roll comes into actual contact with the platen and the work.

The leveler at the GE refrigerator plant at Erie is the second such unit built. The first was installed during the war at Weirton Steel Co.'s Weirton, W. Va., plant for flattening silver chloride. This unit had work rolls 1-3/16 in. in diam, and the material being flattened was handled between steel sheets. Later, this Weirton unit was shipped to General Electric Co.'s Schenectady plant, and is today in operation on a restricted Government project.

The unit at the Erie plant, built later, has work rolls that are $1\frac{3}{8}$ in. in diam, driven by a chain drive with a $1\frac{1}{2}$ in. pitch. The drive consists of an endless double sprocket chain arrangement. The ends of the rolls are laced into the chains on hardened steel pins on $1\frac{1}{2}$ in. centers. This arrangement is discernible in fig. 2. The work rolls are made of alloy steel, hardened and ground. The depth of hardness is from 3/16 to

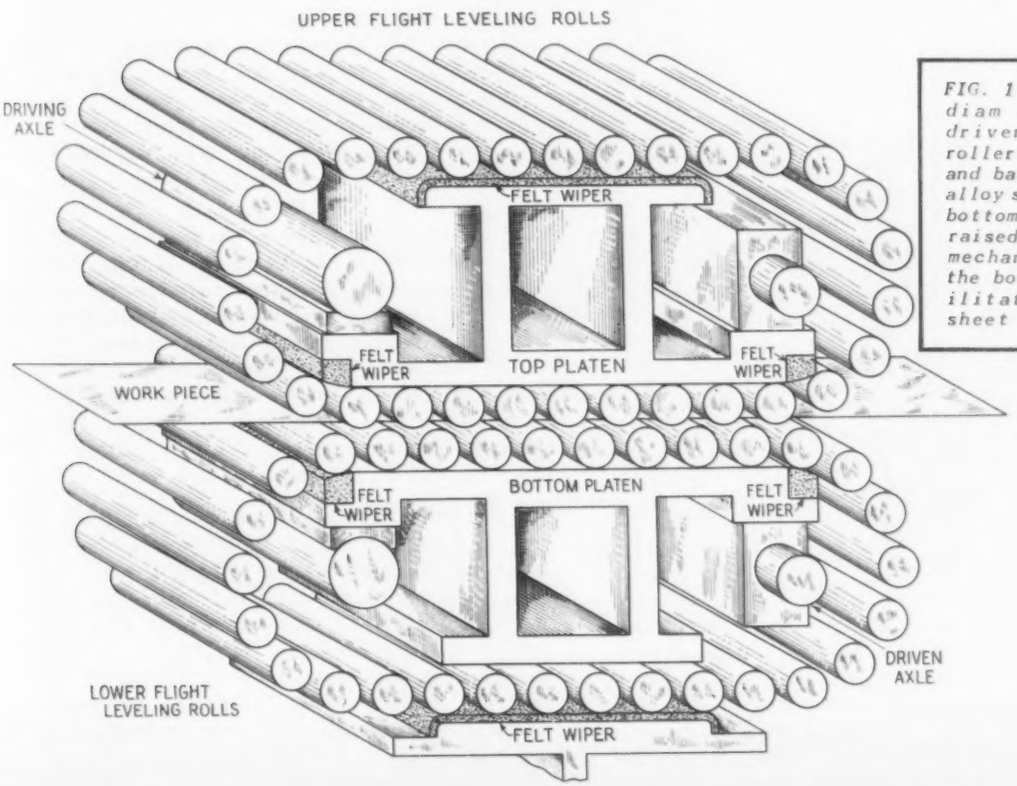


FIG. 1 - The 1-7/16 in. diam work rolls are driven by an endless roller chain (not shown), and back up by the cast alloy steel platens. The bottom assembly can be raised or lowered, and a mechanism for tilting the bottom assembly facilitates feeding the sheet into the rolls.

¼ in., and the surface hardness is between 60 and 65 Rc. The rolls are internally bronze bushed on both ends with special self-lubricating bearings. There are 52 rolls, 36 in. long on each of the chains and the platens run the entire length of the rolls.

The bottom set of rolls and platen can be raised or lowered and adjustments also permit the correct amount of radial tilt for proper leveling. The radial adjustment control is shown in fig. 2, the brake-like handle on the right side of the machine. This adjustment permits the sheet to be fed into the rolls regardless of the flatness of the forward end.

At GE's Erie plant, an operator is positioned at the feeding end of the machine and another at the rear. An inspector at the runout end inspects each sheet for defects and to insure that the prime side of the sheet is down.

Previously, a special solvent cleaner was used with the machine to clean off any dirt and grime from the sheet. Now, however, kerosene is used for this job, but the machine may be run dry using the normal oil coating put on the sheet at the mill.

While the Voss-United leveler was not designed as anything but a sheet leveler, it is evident that with a minor change in roll position it could be used as a temper mill. As a leveler, the top rolls are staggered with the bottom rolls so as to give as much of a flexing action to the sheet as possible. Operated in this manner, there is no reduction in gage. However, if the roll chains were positioned in such a manner as to have the top roll centers in the same vertical plane with the bottom roll centers, reduction of sheet gage would be possible and the unit would act in the capacity of a sheet temper mill.

. . . NEW BOOKS . . .

"Precision Investment Castings," by E. L. Cady. Book provides engineering information on precision investment casting, giving a history of the method, comparisons with other processes, economics of design, discussion of dimensions, accuracies and contours, surfaces obtained, types of molds, dispensable pattern materials, clustering, materials and methods of investing, casting techniques and other information. Reinhold Publishing Corp., 330 W. 42nd St., New York. $6.00. 356 p.

* * *

"Proceedings of the 34th Annual Convention, American Electroplaters' Society." Book reviews the technical sessions of the annual meeting of the A.E.S. Along with a brief general account of the convention, 22 papers and discussions on the papers are recorded. American Electroplaters' Society, Jenkintown, Pa. $10.00. 308 p.

* * *

"Steel Plates and Their Fabrication." Book, designed to aid engineers, designers and others working with steel plates and with structures of which plates are a part, discusses flame cutting, flanging and pressing, forming, welding and riveting. It also includes information for calculating costs, and lists strength and material specifications along with general engineering data. Lukens Steel Co., Coatesville, Pa. $5.00. 408 p.

* * *

"Principles of Personnel Testing," by C. H. Lawshe, Jr. Book discusses the procedures for selecting and using personnel tests. Different tests are described and the advantages and limitations of each are suggested. McGraw-Hill Book Co., 330 W. 42nd St., New York 18. $3.50. 227 p.

* * *

"Practical Job Evaluation," by P. W. Jones. Book discusses job evaluation with emphasis on selection and weighing of job characteristics, development of the wage structure and the salesmanship required to overcome resistance to a job evaluation program. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $4.00. 304 p.

"Developing Public and Industrial Relations Policy." Labor relations, planning and research for top management, and the methods of policy formulation are discussed in pamphlet by five executives. American Management Assn., 330 W. 42nd St., New York 18. $1.00. 52 p.

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"Trends in Retirement Planning." Employee retirement plans are analyzed from the standpoints of employee, company and union attitudes by five industrial relations experts. American Management Assn., 330 W. 42nd St., New York 18. 50¢. 32 p.

* * *

"Modern Management Practices and Problems." Progress and trends in seven fields of management are discussed in booklet by various authorities. Topics covered are the changing aspects of personnel management, production problems and policies, office organization, new aspects of distribution, financial policy, changes influencing insurance buying, and package development and merchandising. American Management Assn., 330 W. 42nd St., New York 18. 48 p. $1.00.

* * *

"Heavy-Density Separation—A Review of Its Literature," by J. W. Hyer, Jr. Booklet summarizes the principal heavy density processes which have been applied to ore and coal beneficiation. Pipe line transportation of ores, laboratory tests and other subjects related to heavy density processes are also discussed. Colorado School of Mines (Quarterly), Golden, Colo. 94 p. $1.00.

* * *

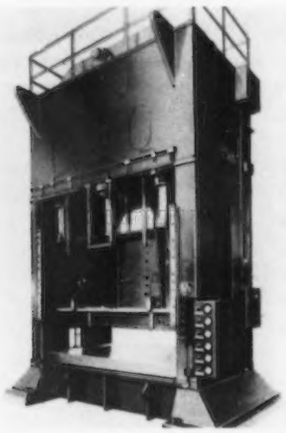
"Hot-Dip Galvanizing Practice," by W. H. Spowers, Jr. Second edition of this book describes methods for galvanizing straight and tight coat wire, netting, hardware cloth, pipe, pipe fittings, sheets, stamped metalware and other products. Procedure for building a galvanizing plant is discussed and information on electrically heated kettle settings, pyrometry, reduction of dross losses, fluxes and other subjects is included. Penton Publishing Co., 1213 W. Third St., Cleveland 13. $6.00. 188 p.

New Production Ideas . . .

A mechanical-hydraulic deep drawing press, a double-spindle milling machine, a sheet metal fabricator, a longitudinal seam welder, and a drawer-type oven are featured in this issue, together with a supersonic reflectoscope for inspecting welds, a self-centering drill turret, an angular magnetic chuck, and refractory cupola blocks.

Deep Drawing Press

MECHANICAL and hydraulic principles of force application have been combined for the double action deep drawing of ferrous and



nonferrous metals, in the deep drawing press announced by *Verson Allsteel Press Co.*, 1355 E. 93rd St., Chicago 19. Among the advantages claimed for this combination mechanical-hydraulic press are: Increased production on deep draw; instantaneous adjustment of pressure by valves and direct reading gages at any pressure point on the blankholder; blankholder is self-adjusting for any thickness of stock; elimination of the use of shims; and there is no tool damaging impact between blankholder, stock and die. These presses can be converted from double action to single action press work. Press cycle is fully automatic and controlled by means of electric push button and selector panel. This type of press is available in a wide range of bed sizes and tonnage capacities.

Buffing-Polishing Machine

SMALL parts up to 3 in. in diam can be finished at the rate of 130 to 800 per hr on an automatic electrically powered buffing and polishing machine manufactured by *Vanott Machine Corp.*, 228 Colgate Ave., Buffalo 20. The V-8 buffing machine has eight spindles on a revolving head which indexes at predetermined speeds. Each spindle is provided with a chuck, or a gripping device to hold the work being buffed or polished. The machine is equipped with a ¼ hp motor.

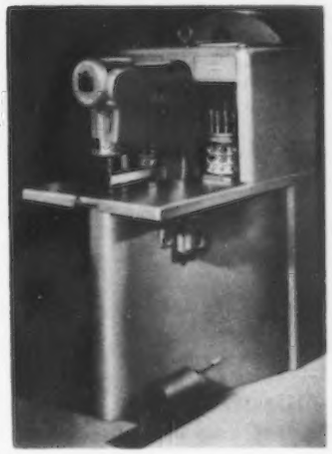
Twin Miller

FOR milling two surfaces in a single pass, the Twin Miller, a double-spindle high-precision machine has been developed by *W. H. Nichols Co.*, Waltham, Mass. The

machine has two opposed independent geared milling heads powered by pancake type motors, and each has available 15 spindle speeds from 55 to 2080 rpm. Each milling head is adjustable in three planes: horizontally by means of slides and set screws; vertically; and transversely by feed screws with direct reading micrometer dials. Maximum height of spindle centerline above table is 12 in., minimum height, 1½ in. Distance between spindle noses across table is 16 in. max 4 in. min. The 8½x34 in. table is pneumatically powered by a solenoid-operated air cylinder and travels a maximum of 12 in. with a 9-in. hydraulically controlled cutting stroke.

Sheet Metal Fabricator

A SHEET metal fabricator which punches, notches, nibbles, bends, forms, and blanks has been announced by *Wales Strippit Corp.*, 345 Payne Ave., North Tonawanda, N. Y. Wales self-contained units form the nucleus of the machine. A self-contained holder is slidable on ways in the press bed. Various round and shaped punches and dies are interchangeable in the holder to provide a quick change punch and die system. Three dies of various clearances are provided for each punch to accommodate material up to 3/16 in. thickness. All burring operations are eliminated with the quick change system. Changeovers of setups and operations are accomplished in a matter



of seconds. One of the outstanding features of the fabricator is the Hydra-New-Matic head which operates with a minimum of vibration and noise at 165 strokes per min

for single hole punching and for nibbling. Non-repeat, feather touch trip lever releases ram instantaneously for down stroke. Dual control of the ram strokes is provided by an adjustable foot trip mechanism.

Bench Lathe

A MODERATELY priced 10-in. bench lathe with a 1-1/16-in. hole through the spindle and an

integral horizontal motor drive has been added to the line of precision lathes manufactured by *Sheldon Machine* Co., 4258 N. Knox Ave., Chicago 41. It has the basic features of larger industrial lathes: ¾-in. collet capacity, tapered roller spindle bearings, double walled worm feed apron with power cross feed, full quick change gear box that gives a thread cutting range of from 4 to 224 threads per in. The four-step, V-belt motor drive is designed to take either a 1/3 or ½ hp motor.

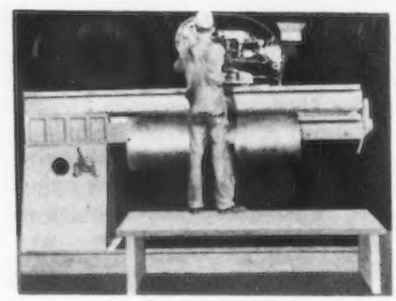
Horizontal Band Saw

METALS up to 5x10 in. in cross section can be cut-off with the Model B portable band saw introduced by *Johnson Mfg. Corp.*, Room 638, Chrysler Bldg., New York 17. The machine has a rigid

box type frame with the wheel assemblies mounted high on welded steel brackets. The bed, 7 in. wide x 28 in. long, is set on a three-point base to insure that the saw is always supported free of torsional strain. An improved hydraulic unit is built into the machine to give correct feed for every section, and a stock stop gage is supplied for duplicate cutting. The machine operates and shuts off automatically. Blade speeds are 45, 90 and 150 fpm.

Seam Welder

TO provide a positive copper backup for automatically welding longitudinal seams in tanks and other cylindrical shapes, *Reed Engineering Co.*, 1003 W. Fairview Ave., Carthage, Mo., has developed a new longitudinal seam welder. In this machine the copper backup bar is forced upward against the copper holddown clamps by an air-operated



toggle linkage which exerts sufficient pressure to press the seam flat and back up the edges during the welding operation. It is available in six standard sizes ranging from 6 ft x ⅜ in. up to 9 ft x ⅜ in. thickness. Standard machines will handle diameters up to 40 ft. It is available with tracks to fit standard type automatic welding heads and can be obtained with water cooling on the main backup bar.

Telescopic Gage

FOR measuring form and hole sizes in tool, die, and machine work, a universal telescopic gage has been marketed by *Penjaska Tool Co.*, Box 210, Owosso, Mich. Combining telescoping and flush pin gage principles, the gage measures openings of internal angles, radii, tapers, dovetails, etc. without the necessity of removing the work from the machine. The gage indicates exact size of trial cuts and how much stock remains to be removed. It also measures size of shallow holes and narrow slots, and has a range of from 0.160 to 0.760 in. The gage is made of tool steel, hardened, ground, and lapped.

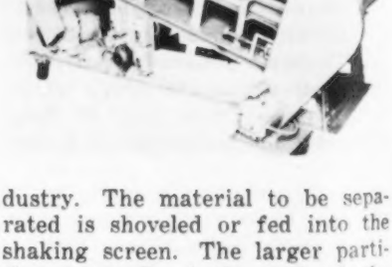
Electronic Power Generator

FOR production induction heating, *High Frequency Heating Co.*, 143 Glen Park Ave., Gary, Ind., has developed the HFH-1, 2A-I, electronic power generator. Design of output components is such that copper and brass may be heated to desired degrees with only a single turn work coil. The generator is applicable to such operations as soldering and brazing, hardening, annealing and heating for forging small units. High frequency power is generated by a single-ended Colpitts oscillator. Three compart-

ments house parts and components and work coil connections are mounted on heat resisting panel on front. Water cooling of work coil is provided for high efficiency energy transfer. Power output is 1200 w, frequency 400 kc. Safety is an outstanding feature with panels and cover interlocked in such a maner that it is impossible to open or remove them without causing high voltages to be shut off.

Magnetic Separator

A MAGNETIC separator which combines a complete magnetic pulley type separator with a combination shaking screen and feeder has been designed by *Magnetic Engineering & Mfg. Co.*, Clifton, N.J., for handling miscellaneous scrap metals, and for reclaiming molding and core sand in the foundry in-

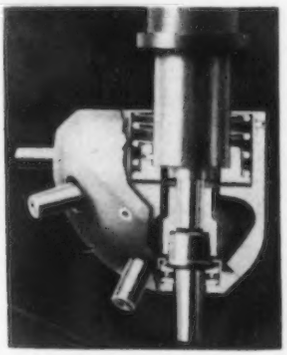


dustry. The material to be separated is shoveled or fed into the shaking screen. The larger particles pass off of the end of the screen; the finer material passes through the openings of the screen onto the conveyer belt, where it is carried up over the magnetic head pulley and magnetic materials are

separated from the non-magnetic. The machine is portable and is complete with unit motor drive and motor generator set. The unit is built in a variety of sizes with belt widths ranging from 12 to 60 in.

Self-Centering Drill Turret

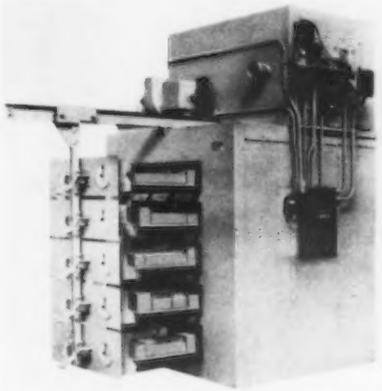
A DRILL press turret constructed with its six spindles automatically centered and aligned by the drill press spindle has been released under the tradesmark Lign-o-matic, by *Howe & Fant, Inc.*, 521 Flaxhill Rd., South Norwalk, Conn. With this construction the turret has a sustained accuracy equivalent to the drill press to which it is attached. The six spindles are mounted on floating bearings which permit free movement laterally, angularly, and rotating. As the tapered driving unit, attached to the drill press spindle, engages the



mating taper of the turret spindle, it centers and aligns this spindle and locks it in position. Driving power is transmitted from the machine spindle to the drill press turret spindle by the tapered surfaces which accomplish alignment.

Drawer-Type Oven

AN all-purpose drawer-type oven has been designed by *Despatch Oven Co.*, 619 S.E. 8th St., Minneapolis, for maximum foundry usefulness. Built lower and more compact, this selfcontained unit is factory wired and shipped assembled. Unit fan and heater are enclosed in an insulated box mounted on top of the oven body. The vertical support bar does not interfere with loading from any angle. Overhead rail suspension of cast iron rollers permits smooth, easy drawer action. A rear plug on the drawer seals the oven against heat loss when drawers are open. Twenty-four standard models of 3, 4 or 5-drawer types, gas, oil or electric fired, with forced convection, are



available. Drawers range in size from 30x36 in. to 48x72 in.; and from 8 to 18 in. in depth.

Drill Reamers

DRILLING and reaming in a continuous stroke is possible with the new high-speed drill-reamers offered by *Severance Tool Industries Inc.*, 742 Iowa St., Saginaw, Mich., in five standard sizes, 3/6, ¼, ⅜, ½, and 9/16-in. The drill section of the tool provides for drilling through materials of any thickness up to that equalling their diameters. The reamer section is designed with teeth so arranged as to preclude chatter and expel the fine wool-like chips into the main flutes of the tool. Drill reamers are best suited for short, through holes, where it is possible to complete the drilling function before the reamer section begins to finish.

Electric Drill Kit

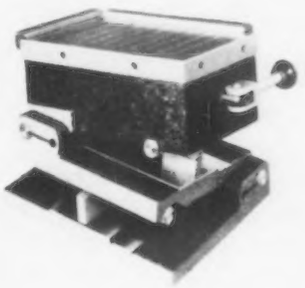
CONSISTING of a ¼-in. portable electric drill and 10 high-speed drills, Hi-Power Model 77 electric drill kit has been announced by *Portable Electric Tools, Inc.*, 255 W. 79th St., Chicago 20. The drill has a 100 v, ac-dc, air-cooled motor; chromium plated, rustproof finish on the body; and pistol-grip handle with a trigger switch. It weighs 2 lb 12 oz and is arranged in a handy steel, hinged-cover carrying kit.

Supersonic Reflectoscope

WELDS in ferrous metals and light metals can be inspected for lack of bond, inclusions or voids by means of a technique employing high frequency sound waves generated by a supersonic reflectoscope. The development by *Sperry Products, Inc.*, 1505 Willow Ave., Hoboken, N. J., is known as angle beam transmission, and directs the sound beam into the welded part at an angle. The searching unit, whose primary element is a quartz crystal, can be placed on the smooth parent metal adjacent to the weld or at some distance from it. Any voids or inclusions will reflect part of the sound beam back to the searching unit where it will be amplified to provide a vertical deflection of the horizontal trace on an oscilloscope screen. A time marking system allows calibration to determine the distance from the unit to the flaw, making it possible to distinguish between any defects in the plate and those in the weld area.

Angular Magnetic Chuck

THE Magna-Sine with permanent-magnet chuck, developed by *Robbins Engineering Co.*, 318



Midland Ave., Detroit 3, may be used on either wet or dry machining and grinding operations. Magnetic power is controlled by the amount that the handle is turned. With the permanent magnet chuck, parts are not magnetized when removed from the chuck. The Magna-Sine is built in two models: one for single angles only and the second for both single and compound angles. Both models are available in two sizes.

Heavy-Duty Time Switches

IMPROVEMENTS in the line of heavy duty time switches, manufactured by *Sangamo Electric Co.*, Springfield, Ill., are said to provide superior performance and permit wider application with more practical utility. All heavy-duty time switches are now equipped with the Sangamo-developed fully-enclosed Hysterisis-Synchronous, low-speed motor, said to achieve higher torque both in starting and synchronous

operation. A replaceable bearing system Silicone lubricated, prevents switches from being affected by temperature. Minimum time between settings of the off and on periods is 90 min; time intervals between on and off periods is 30 min. Manual tripping can be done any time without disturbing the automatic operation.

Portable Potentiometer

FOR precise measurements of low voltages, a portable potentiometer has been announced by the *General Electric Co.*, Schenectady 5. The potentiometer is designed for checking temperature-measurement instruments and for testing rotating machines, ovens, furnaces, oil-burners, steam-driven equipment, and air-conditioning units. The equipment of the potentiometer, contained in a fabric-covered luggage case, includes the galvanometer, standard cells, working batteries and rheostats for adjusting the current through the potentiometer circuit. The galvanometer, which is not built in, is furnished with a built-in transformer. The potentiometer has two ranges, 0-60 and 0-6 millivolts. The voltage to be measured is read on two dials.

Universal Cupola Blocks

REFRACTORY cupola blocks which permit the setting of a range of lining diameters with whole blocks of a single shape are produced by *Harbison-Walker Refractories Co.*, Pittsburgh 22. The range of diameters accommodated

by the given shape is from 2 to 8 ft and larger, ID, in multiples of 3 in. The new shape, known as the universal cupola block, is of standard 9x6x4 in. dimensions, featuring alternate convex and concave ends which form a tight fitted-curve end joint that maintains a complete contact over the entire end surfaces. This makes possible the setting of various lining diameters of whole blocks, without cutting. Because of the flexible joint, the universal cupola block is recommended for vertical tanks or furnace linings rather than horizontal cylindrical shells. The blocks are a fireclay product of various blends and burnings adapted to particular cupola services.

20-Ton Electric Truck

THE 20-ton ram-type electric power truck announced by the Material Handling Div., *Yale & Towne Mfg. Co.*, Philadelphia, is

designed to improve coil handling during processing, storage, and shipping operations in steel mills. It has an elevating height of 10½ ft, and a lifting capacity of 20 tons. Maximum speed under load is 5 mph and a 360° rotating drive unit permits operation in narrow aisles. Loading, transporting, and tiering operations can be seen by the operator without leaving his post.

Resistance Welding Alloy

MALLORY 22 metal, a seam welding electrode metal, developed by *P. R. Mallory & Co.*, Indianapolis 6, is a high conductivity copper base alloy containing cadmium and zirconium. The high conductivity and hardness with its resistance to annealing makes it a versatile electrode alloy for coated metals such as galvanized iron, terne plate, etc., and for ordinary carbon steel. The metal is available as forged blanks or finished machined wheels of a variety of sizes.

Fuel Oil Additive

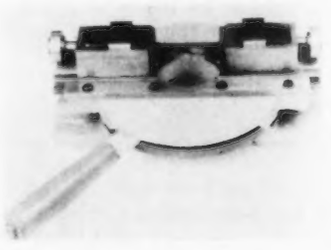
TO clean oil systems from tank to stack, a fuel oil additive has been developed by *E. F. Houghton & Co.*, 313 W. Lehigh Ave., Philadelphia. Known as Houghto-Soly, this mixture removes all traces of sludge throughout the entire fuel system, it is reported. It meets plant safety regulations, is safe to use and store, and is not toxic. It is non-corrosive and will not harm metals or working parts of the heating system. Houghto-Soly is added directly to the fuel tank in the ratio of 1 qt to 1000 gal of fuel oil.

Snap Fasteners

PUSH-IN type snap fasteners, stamped from spring steel to form a vibration-resistant lock to hold panels and brackets in place and which require no thread or special receptacles, are now available from *Shakesproof Inc.*, 2501 N. Keeler Ave., Chicago 39. The fastener is seated by pushing with thumb and is said to replace as many as four or more separate pieces. In the fabrication of these snap fasteners, extended spring prongs are stamped as an integral part of the fastener. These prongs compress as the fastener is pushed into a punched or drilled hole and spring out again on the far side of the joint to hold the assembly together under constant spring tension. They are designed to accommodate total material thickness variations of more than 1/16 in. without loss of efficiency.

Cam Actuated Vise

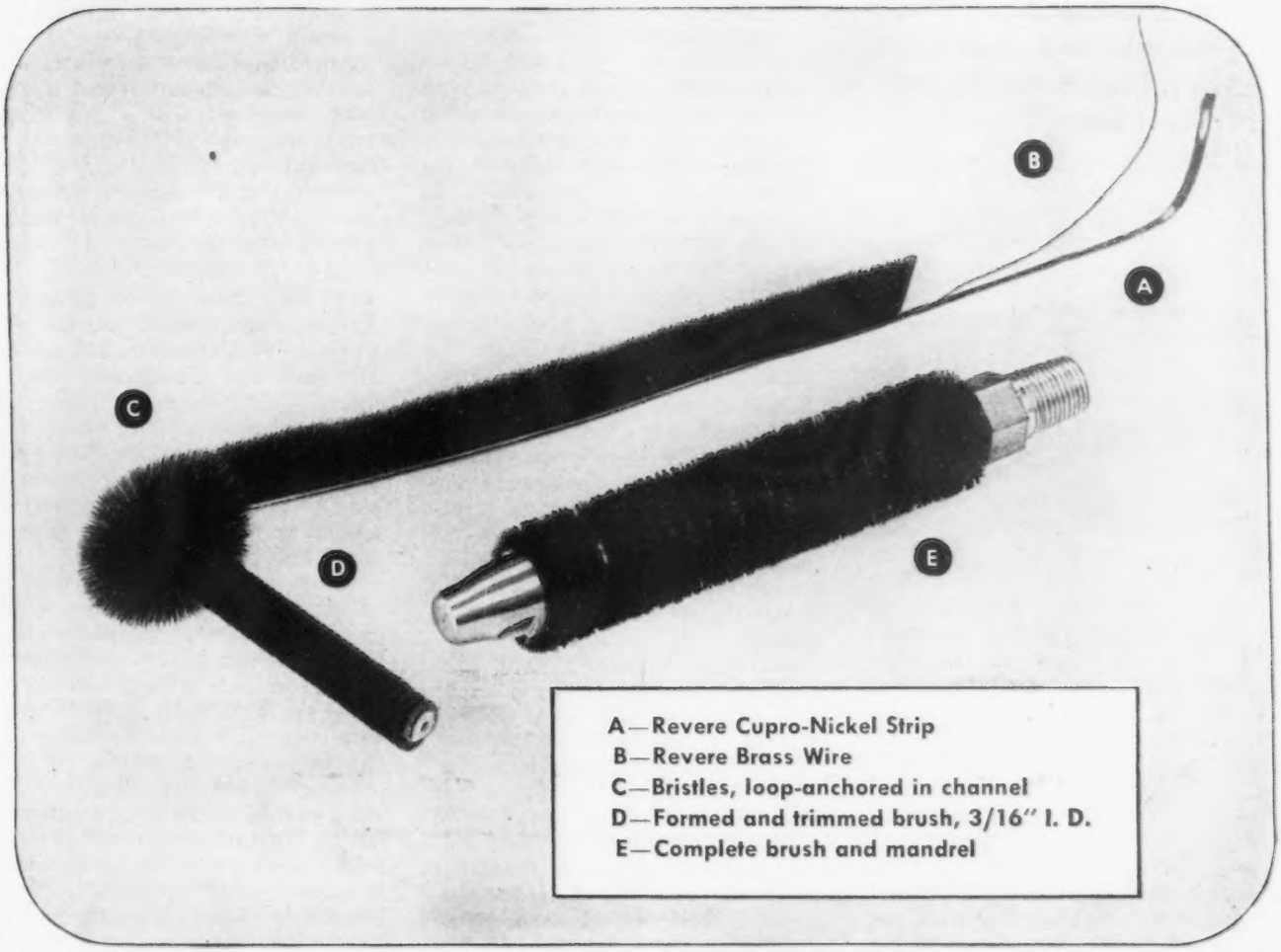
FOR milling, drilling and threading, the double cam actuated vise produced by *Nutmeg Tool & Products*, Norwich, Conn., locks the work with one motion of the handle,



automatically centering the work regardless of dimentional variation. Return motion of the handle releases the work and removes the chips. Rugged in construction, the vise has adjustable jaw opening, is non-clogging and requires no lubrication. Special jaws can be provided for specially shaped parts and a 3-in. hole through the center of the vise allows work to drop directly into a tote box. The vise is made in two sizes.

HOW FULLER AND REVERE LICKED

a tough brush problem


A—Revere Cupro-Nickel Strip
B—Revere Brass Wire
C—Bristles, loop-anchored in channel
D—Formed and trimmed brush, 3/16" I. D.
E—Complete brush and mandrel

DAIRIES use a great many small cylindrical brushes to clean the insides of pasteurizing and other tubes through which milk flows. The Fuller Brush Company wished to offer this market brushes that would utilize its Fullergript principle, consisting of bristles loop-anchored inside a metal backbone. Such a brush would obviously provide superior cleaning performance, and longer life, than the tufted type. However, the small inside diameters of the dairy tubes meant that the metal backbone would have to be formed into an extremely small and close coil, with the inside diameter of the coil about 3/16". This posed the question: what metal or alloy would withstand this exceptionally severe double deformation?

After a few experiments had proved that the problem was far from easy, Revere was called in. The Revere Technical Advisory Service, after an extended study of the matter, suggested a trial of a certain gauge and type of cupro-nickel strip. A test run proved entirely successful, and regular production soon began. Thus Fuller was enabled to offer its Fullergript brushes to the dairy industry.

This is but one of a great many examples of Revere's successful collaboration with industry. If you have a fabrication problem in non-ferrous metals, get in touch with Revere.

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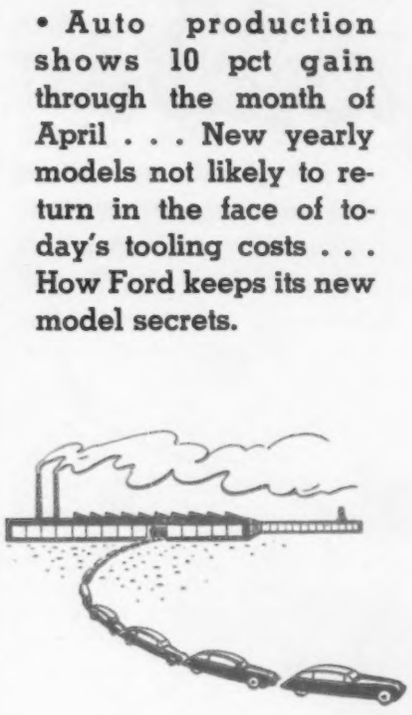
Assembly Line . . .

WALTER G. PATTON

• Auto production shows 10 pct gain through the month of April . . . New yearly models not likely to return in the face of today's tooling costs . . . How Ford keeps its new model secrets.



DETROIT—Critical observers looking back at the year 1948—at the threatened strikes and actual shortages and the international horizon—can always say, "Yes, some of these threats did materialize but the industry did get off to a magnificent start."

In the first 18 weeks of 1948 auto production was up approximately 10 pct over the previous year . . . The industry was headed for a new output record during the year. Statistics compiled by Automotive News showed that by the end of April, 1,241,935 passenger cars and 484,559 trucks, a total of 1,726,494 vehicles were assembled. The corresponding figure for 1947 is 1,570,454.

This accomplishment was realized in the face of the industrial gas shortage, on extensive changeover for new models at Ford and the usual chorus of complaints about a steel shortage.

What few people appear to realize is that the promised whopping increase in auto plant capacity during the postwar period is now an accomplished fact. Once an adequate bank of materials is available it will be possible for the industry to turn out 150,000 to 160,000 cars per week whereas in the prewar years the top weekly production was about 125,000 vehicles.

Another aspect of the new production picture is that such an accomplishment will be possible with only a few departments working two-turns. At the present time, few departments in automobile factories are working two shifts. It just isn't economical—as Kaiser-Frazer learned—to try and work two shifts unless materials and labor are much more dependable than they are today.

* * *

IT will be interesting to watch the the effect of skyrocketing prices on the accepted automotive custom of making extensive model changes every year. Most sources here now agree that the tendency to freeze model designs is strongly on the increase, a fact that was evident enough from the delays experienced in introducing many of the postwar models.

Several of General Motors' divisions, for example, have made only minor changes since auto production was resumed after the war. Yet today they are still in an excellent competitive position. If they care to do so, these same GM divisions can continue their present model runs through 1948 without losing too much to their competitors. Moreover, the more the changeover is delayed, the more the process can be perfected and the less production time will be lost in the changeover.

The changeover problem seems to boil down to this: Is it better to keep on with the old models and probably shorten the changeover period than to bring a car up-to-date immediately and without further delay? It is probably significant that the producers who have changed over up to the present time are those who were in the least advantageous position from a competitive standpoint.

Another reason for the delay in postwar cars is that the investment required is staggering. And the present costs will run much higher if another round of wage increases is agreed upon. On its four new lines of cars Ford is reported to have spent more than $90 million. Hudson's changeover is said to have cost $16 million. Packard has invested $15 in its new model. Studebaker's investment in its postwar car is substantial and the recent introduction of a new model truck will add to the total. It is also anticipated that late in 1948 or early 1949 Studebaker will make some significant changes in its present passenger car.

UNDER today's conditions it may be expected that the new Chrysler tooling will be $60 million minimum and the General Motors figure should be even higher. In its recent stockholders report, for example, GM disclosed that the postwar investment for its new plants and facilities, including special tools, has already aggregated $600 millions.

In the light of these unprecedented expenditures it would seem apparent enough that the new models being introduced today are going to be used in their present basic form for 2 years at least. Most sources here believe the trend from here on will be toward limiited yearly improvements but not completely-revised-models for another 2 years at least. Some observers will be surprised if drastic body changes are made before 1952 although it seems reasonably certain that the introduction of high compression engines to save fuel will take place within the next 24 months.

Hence if you buy a new car now, you can be reasonably certain, say the experts, that it won't be out of date so far as styling is concerned for the next couple of years—at least. It just doesn't seem possible to the most Detroit sources that the style applecart is going to be upset for another 3 years regardless of how successful may be the latest producers to jump into the automobile competition.

It can also be pointed out that the new entries in the auto sweepstakes are much more seriously circumscribed by the materials shortages than were any of their predecessors. As informed observers know, the push into fourth position by Kaiser-Frazer has been accom-

plished most of all by a near-miracle of procurement. It hasn't been easy, as any one can tell you who is familiar with K-F's struggle to get steel and badly needed parts and equipment. Newcomers in the industry today have to buck both consumer resistance and supplier resistance. And much the tougher of the two jobs is getting the necessary steel and other supplies. Compared to this task, lining up new customers is a push-over, according to the industry's marketing executives.

* * *

INTRODUCING a new model car involves a tremendous amount of undercover work. Hundreds of people have to be let in on the secret. Yet the number of leaks is surprisingly few, considering the number of individuals involved. It is probably a safe guess that at the present time, more than 100,000 people, including Ford workers, have seen the new Ford. Yet just one picture has appeared thus far in a daily newspaper.

Recently in the Ford Times, W. D. Kennedy described the story of the painstaking precautions that must be taken to guard the new model cars.

Last January during a blinding snowstorm a canvas covered object was rolled out of the Ford Engineering laboratory onto a loading platform and loaded onto a freight car, Mr. Kennedy said. The car was sealed and high-balled to Jacksonville, Fla. At brief intervals 16 other hand-built models were shipped to the same destination.

The rendezvous for Ford's Operation Secret was the abandoned Pine Castle Army Air Base near Orlando. One runway at the base is 10,000 ft long and as broad as six city streets, an ideal setting for low-horizon, cloud-background pictures.

The 1949 model cars were stored under guard in a deserted hangar. From here mystery convoys of haulaways, station wagons and photographer's trucks shuttled back and forth to the Ford branch at Jacksonville and to special locations on estates in Orlando and Winter Park.

There were only two serious threats to the secrecy of the project, according to Mr. Kennedy. On one occasion a curious motor boat circled close in shore where shooting was going on at a lake front estate. Some quick work with a shroud averted a catastrophe.

On another occasion an adventurous young camera enthusiast appeared on the scene armed with three Leicas, each fitted with a telescopic lens. Later it developed the photographer was looking for pictures to sell to magazines. Eventually, he was persuaded that Ford Motor Co. was not quite ready to share a hundred million dollar secret with him and his editors.

There are, of course, often opportunities to see new models on the highways before their official introduction. Sometimes the body lines are removed. Recently the writer had an opportunity to participate in the preview of the Lincoln and Mercury. That night as he was driving home a new Lincoln pulled up beside him at a traffic light.

A top official of a large auto company is willing to swear he saw the 1949 model of his strongest competitor as he was driving along a public highway only a few weeks ago. The model in question is not scheduled to be introduced until late this year.

Monarch Scholarships

Sidney, Ohio

• • • **Directors of** the Monarch Machine Tool Co. have unanimously approved the establishment of a fund of $30,000 from which 15 scholarships of $2000 each will be awarded over the next 5 years. The scholarships will be awarded at the rate of three each year to boys graduating from Shelby County schools with high scholastic records and ambitions to pursue the study of mechanical or electrical engineering.

Each of the $2000 scholarships will be disbursed in amounts of $500 annually towards a complete 4-year course at a leading college or university, in Ohio or elsewhere, according to Jerome A. Raterman, Monarch president.

Steel Nationalization Now Being Drafted By British Government

London

• • • **The British government** has now made up its mind about the form nationalization of the iron and steel industry is to take. Its ideas have been sent to a drafting committee.

There seems to be no doubt that steel nationalization will be the main item of business in the forthcoming new session of Parliament. Something less than full-scale requisitioning or purchase is envisaged. The present idea is for the government to acquire the shares of iron and steel producing firms. On what terms, only the future can say. Individual firms will retain their identity and presumably their present managements.

Obviously, when the bill comes before Parliament there will be concentrated opposition from the Conservative benches and there is likely also to be a great deal of criticism from among the ranks of labor, on the ground that the bill does not go far enough. Left wing members of the Labor party would like to see an all-out scheme of nationalization such as was applied to the coal industry.

o o o

WORLD'S FASTEST? The new 2.4 litre Healey car, made at Coventry, England, is claimed to be the world's fastest standard model car. Mainly for export, the Healey is Continental-lined 4-cylinder, rated over 100 mph, with gas consumption claimed at 27 to 30 mpg.

o o o

Washington . . .

EUGENE J. HARDY

• Mining subsidy payments win favor on the Hill... Manganese, chromite likely to be included... Lagging stockpile buying adds to pressure for incentive payments for marginal mines.

WASHINGTON — Pressure has been building up within Congress to push through legislation to provide subsidies or similar incentives for boosting production by marginal and other high cost metal mines.

Out of the welter of bills on the subject has emerged the Russell Bill, HR-2455. This proposed legislation has been reported out of committee and has been given a rule; however, sufficient pressure has not been placed on the House leadership to have it brought up on the floor for consideration.

Chances are that should action be taken during this session, some revision would be made in its present provisions. As it stands, these call for setting up within the Bureau of Mines an Incentives Div.; this group would determine the subsidies or incentives necessary to develop new mines and encourage marginal production of scarce lead, copper and zinc and, very probably, manganese and chromite. The Bureau would be authorized to add other metals to the list at its discretion.

A maximum would be set for both the overall sum to be spent and the subsidy to be paid for each metal. However, the Secretary of the Interior, under whom the Bureau functions, would be permitted to raise the latter ceiling if deemed necessary.

Actual purchasing of metals so mined would be handled by the Reconstruction Finance Corp. The metal would be resold by the RFC at the going market price and the resulting loss on the deal would be repaid out of a probable annual $80 million subsidy fund provided by Congress.

Back of the move to bring up and revise the Russell Bill is a genuine concern on the part of some members of the Congress concerning the nation's position in regard to its supply of strategic and critical metals, particularly in the event of an emergency. Congress is also showing greater concern over the lagging stockpiling program

OVER the past few months, a subcommittee of the House Public Lands Committee has been holding supplementary hearings on the subject. The Committee has dug out the information that up until the beginning of 1948 the RFC has handled more than $11 billion worth of strategic materials. Wartime demands, followed by industrial reconversion requirements, required all but about $213 million worth of this amount. Out of the $10.8 billion RFC disposals, little more than $400 million worth went into the security (military) stockpile, the Committee has been told.

Military and other government officials, as well as industrial producers and users, have paraded before the Committee. It is reasonably certain that when and if the Russell Bill is called up for legislative action, manganese and probably chromite, would be added to the list of materials named specifically for subsidization.

Generally, larger operators are not proponents of the incentive proposals; many of them feel that they can get along without such aid although it would guarantee continued exploration and probable develment of new reserves. Although it represents something of a reversal of their stand of a year or so ago, indications are that few, if any, are likely to come out in outright opposition to an incentive program.

ON the other side of the fence, are the smaller operators who are quick to point out the number of small mines which have closed down. Unless aid is extended, they say, others will be forced to follow suit, particularly in view of cheap foreign production and lowered tariff rates.

There is an undercurrent of feeling among members of the subcommittee that the "Buy American" clause of the Stockpiling Act has been given the run-around. Also, individual members of the group have centered considerable fire upon the reciprocal trade agreements concluded by the State Dept. last year with foreign governments.

Operators, large and small, agree upon both counts. They believe that a combination of the two factors has tended not only to slow down development work but to lower domestic production and thus contribute to the shutting down of mines. Representatives of the Munitions Board say that the Buy American provision has hampered stockpiling acquisitions.

Industry has furnished the subcommittee with statistics to show how Indian miners are often paid as little as 2¢ a day as against $1 or more an hour for American labor; also, it was said, land transportation cost in this country was from two to four times the ocean transportation from India. Foreign delivered prices, they say, "are ruinous."

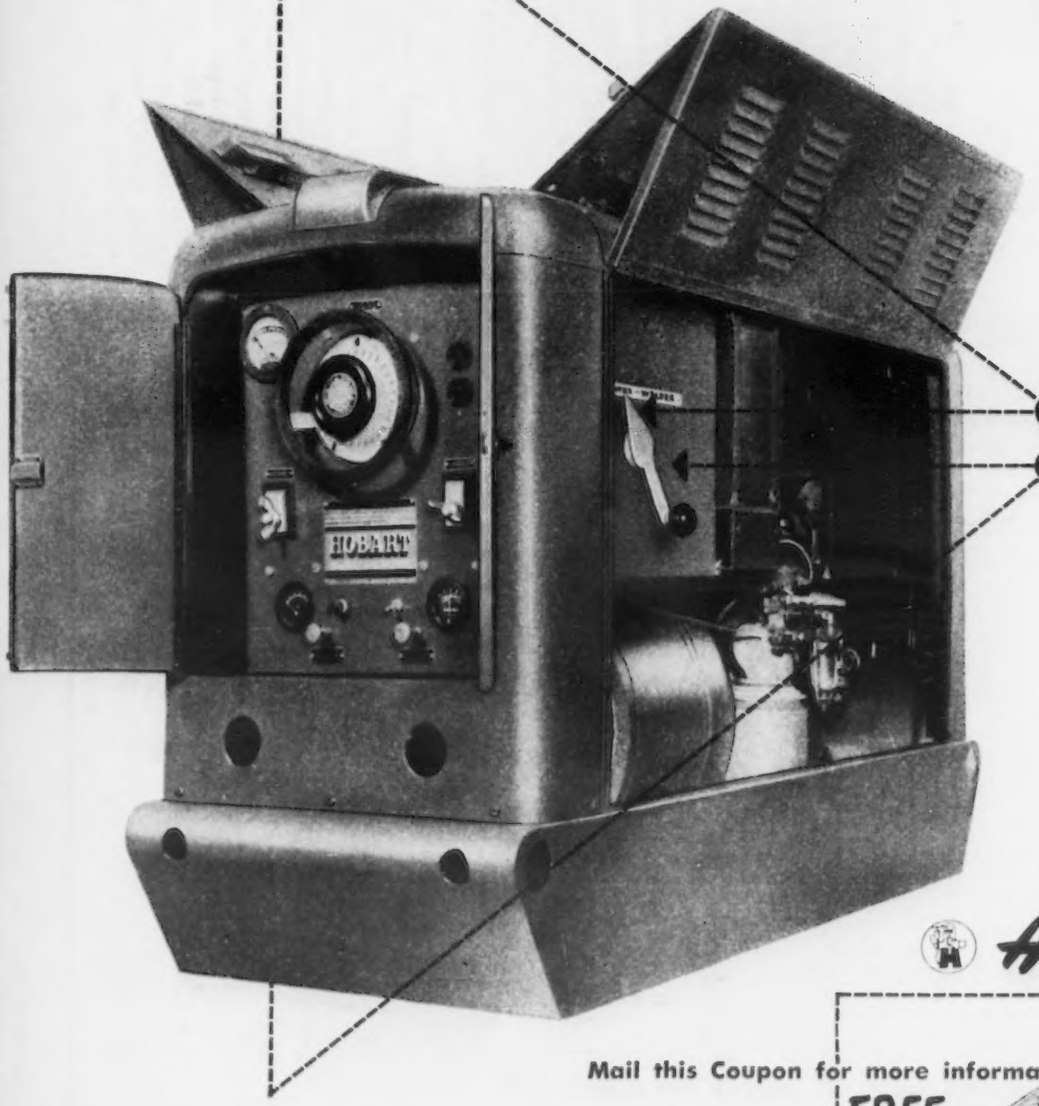
MANGANESE production, it was declared, has slumped from 250,000 tons annually to 130,000 tons. Domestic requirements of 1.2 million tons must be met before any can be set aside for national stockpiling. The deficit between production and consumption is made up with imports from various countries of which Russia and India, both trouble spots or at best indefinite suppliers, are two of the chief American sources.

Information compiled by the sub-

A *revolutionary* A·C Welder and Power Unit

the Hobart A·C

POWER-WELD



At last, here's a gasoline engine driven machine that will make you completely independent of power lines for producing AC arc welding current and AC power to operate lights, tools and all sorts of electrical equipment. This exclusive Hobart development is the first in the history of arc welding that makes it possible to use alternating current for welding without being tied down to locations where power lines are accessible. Now you can have AC welding current to do Inert-Gas-Shielded welding in the field.

welding a-c current

power a-c current

In addition, it powers all 110 volt AC lights, tools and equipment within its capacity. By merely throwing the switch to "AC Power" you immediately convert this welder to a gas drive power unit to operate lights, electric tools and equipment where no other electric power is available. As an emergency power source, this unit can save you hundreds of dollars in case of normal power failure. Prevents loss of time due to normal power failures – lets you proceed with work and keeps equipment operating as usual. Ideal as maintenance and repair unit for industry, life saver for contractors, and money maker for the job welding shop. Return the coupon today for complete specifications on this machine and learn how it can be used profitably on your work.

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committee indicates that combined industry stocks and the national stockpile add up to no more than 3 million tons at present. This represents only a third of the minimum amount which the subcommittee sees as necessary should the nation have to embark upon a 5-to-8 year war.

Opposing the passage of any such incentive payments program, of course, are economy minded Congressmen from the nonmining states. This is offset to some extent by the gravity of the stockpiling situation and the proposals that all materials on which subsidies are paid must go into the military stockpile. This is a valuable ace in the hole for subsidy backers.

ECA Tells Exporters To Solicit Business As Usual Under ERP

Washington

• • • **American exporters** who have established contacts with agents and distributors in Europe should continue to solicit business as they have normally done in the past for shipment of their products to Europe under the European Recovery Program at the present time, according to a joint statement issued by the Economic Cooperation Administration and the Dept. of Commerce.

All arrangements for the soliciting of orders, the requesting of export and import licenses and exchange permits, the shipping and storing of goods, and the payment for individual shipments will be initiated and carried through by the private exporter in the U. S. and the importer in Europe.

Only certain bulk food products that are in short world supply, such as grains, rice, flour, fats and oils, and a small volume of relief supplies, such as drugs, have largely been bought on an interim basis by the U. S. Government and shipped direct to European Governments. These food commodities were bought and shipped by the Commodity Credit Corporation of the Dept. of Agriculture.

Some of the surplus agricultural products acquired by the CCC under its price support program will also be made available for purchase by the ERP governments with ECA funds. The relief supplies were bought and shipped by the Bureau of Federal Supply.

European importers will consult with their governments regarding the need for a particular product as part of the recovery program. The European governments will—in consultation with U. S. Government agencies — program the requirements to be paid for with funds of the ECA. (When the European governments have reached an agreement with the U. S. as to the requirements which are to be financed by these funds, public announcement of the list of goods will be made.)

The European importer will obtain permission from his government to pay for his goods with dollars that are set aside for ERP purchases. A permit system will be set up so that the ECA in the U. S. and the European governments will be enabled to keep account of the funds that are spent. The mechanics of this system are now being worked out. Whatever system of accounting and disbursement is devised, the European importer—not the U. S. exporter—will initiate the first action in requesting permission to use ECA dollars to pay for a shipment.

When the U. S. exporter receives an order from an importer in an ERP country, he will apply to the Office of International Trade, Dept. of Commerce, for an export license, if an export license is needed for the goods order. Neither the ECA nor any other agency of the government will guarantee the granting of an export license simply because an importer in an ERP government has received permission from his government to pay for a shipment with dollars. In granting export licenses for shipments to these countries, the OIT will follow its normal procedures.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

BY CUTTIN' AN' INCH OFF TH' HUB WE CAN USE THIS SCRAPPED ONE ON CRANE 99944 -- OR ORDER A NEW ONE!
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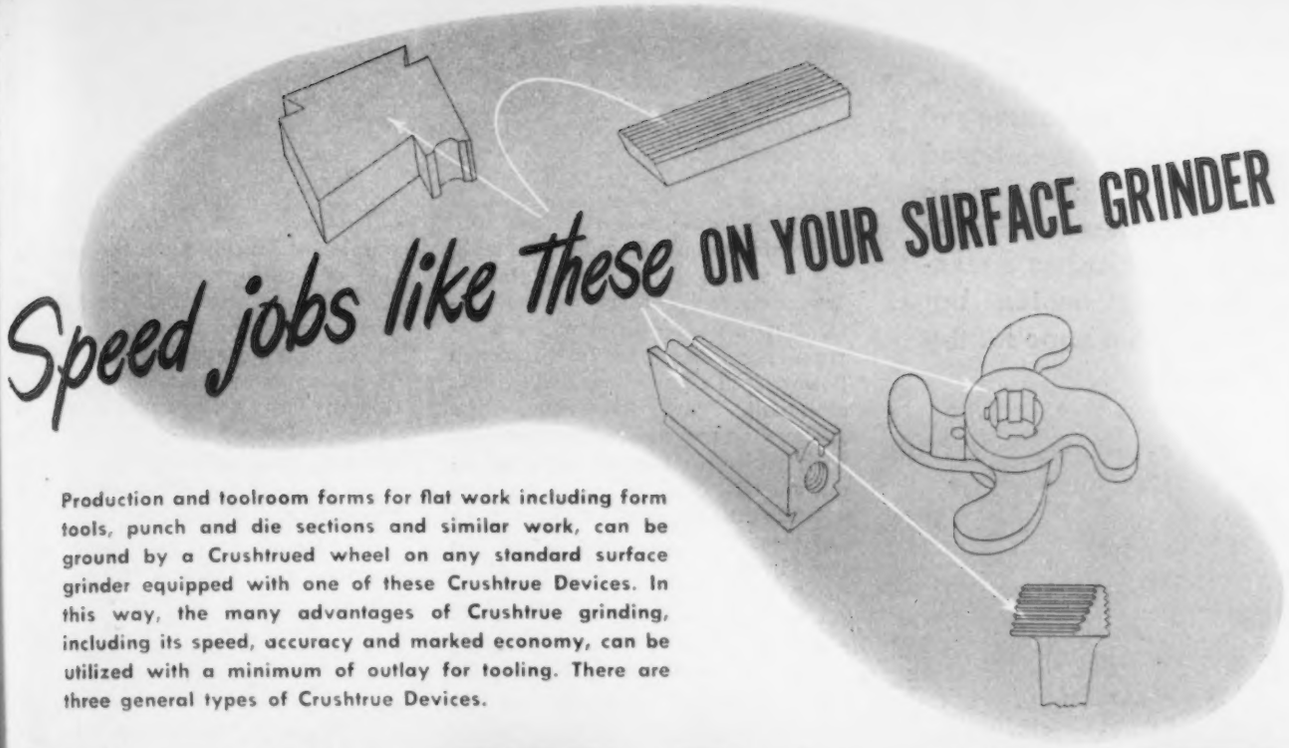
THE "IRON" MAN

Pipeline Hearings Set

Washington

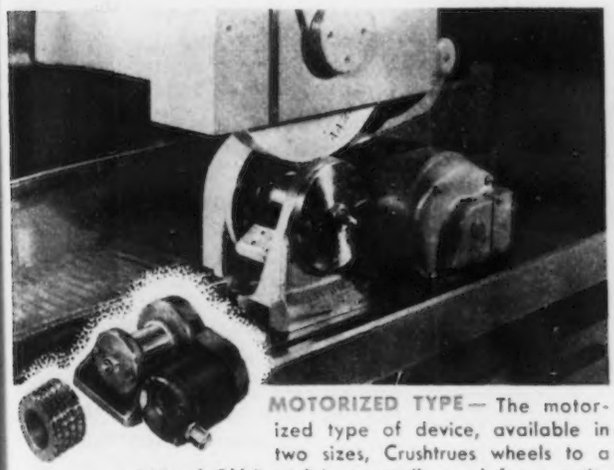
• • • **Federal Power** Commission hearings will begin on June 28 on the Trunkline Gas Supply Co. application to construct and operate a gas pipeline from Wharton Co., Tex. to Keokuk Co., Ia.

The proposed pipeline would consist of 855 miles of 30-in transmission pipe and gathering facilities including 60 miles of 24-in feeder lines and 12 compressor stations. It is estimated to cost about $75 million.



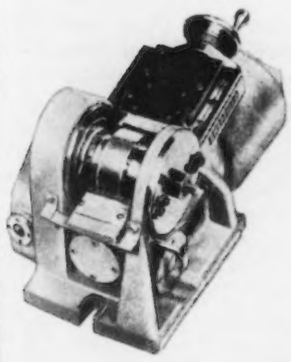
Speed jobs like these ON YOUR SURFACE GRINDER

Production and toolroom forms for flat work including form tools, punch and die sections and similar work, can be ground by a Crushtrued wheel on any standard surface grinder equipped with one of these Crushtrue Devices. In this way, the many advantages of Crushtrue grinding, including its speed, accuracy and marked economy, can be utilized with a minimum of outlay for tooling. There are three general types of Crushtrue Devices.



MOTORIZED TYPE— The motorized type of device, available in two sizes, Crushtrues wheels to a width of 3⅛" and is generally used for quantity production operations.

IDLER TYPE— The idler type is also available in two sizes. The smaller is used on grinders employing wheels up to 1" face. The larger utilizes wheels up to 3⅛" face. The units are generally used on grinders which have a slow speed spindle drive (approximately 300 fpm).



SELF-TRUING TYPE

The self-truing type is engineered especially for producing parts which must be held to a very high degree of uniformity. It incorporates a flat carbide form tool which is used to periodically reform the cast iron Crushtrue Roll without removing the roll from its mounting.

CRUSHTRUE ROLLS

Sheffield is prepared to regrind promptly, any Crushtrue Roll after it has become sufficiently worn in service. In addition to that, a large stock of standard rolls is maintained for immediate delivery or in exchange for rolls sent in to be reground. The Bank includes all Standard U.S. threads from 8 to 32 pitch inclusive.

Sheffield **would like to send you new literature describing Crushtrue grinding and its outstanding economic advantages.**

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Microform and Visualform Grinders
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Special Machine Tools

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West Coast . . .

ROBERT T. REINHARDT

• At least one survey of Los Angeles area based on 1929-1939 decade finds it more romantic than practical as a manufacturing center, but offers some hope for the future.

LOS ANGELES—Out of this community where any adjective weaker than "colossal" reputedly is unheard of, comes an economic study which dares to state, "the popular picture of Los Angeles as a manufacturing center is more romantic than practical."

In a publication titled, "Favored Industries in Los Angeles" economists Philip Neff, Lisette C. Baum and Grace E. Heilman present the results of their comparative studies analyzing the production costs in 13 industries in this area compared to those in five other cities, using as the base period the years between 1929 and 1939. This decade was selected by the authors on the assumption that, "this span is sufficiently recent so that many of the trends that were evident then can reasonably be supposed to be continuing in the current decade."

The Haynes Foundation which sponsored this study is an independent organization endowed by the founders for the purpose of "promoting the well-being of mankind" and avowedly has no economic or social program of its own to promote.

Selecting Detroit, San Francisco, Pittsburgh, Cleveland and Chicago for this comparative study it is pointed out that all six areas have some similarity in economic pattern and that all groups are represented.

Pointing out that industries seeking locations for their plants are subjected to all forms of solicitations which promise plentiful labor supply, indulgent tax rates, cheap power, insatiable markets, and abundant raw materials, the authors offer relaistic comparisons with which to temper glowing inducements.

According to this report those industries included under the heading "Iron and steel and their products" have been handicapped because of an upward trend in labor costs and material costs. However these industries held the most popular position of sixth place in the labor and material cost trend comparison.

In reviewing the labor tendencies in this field during the 1929-39 decade, these investigators stated: "In all areas there was a decrease in dollar output per worker during the decade, with San Francisco coming closest to recovering its 1929 level by the end of the decade. This decrease did not mean a decline in the intrinsic efficiency of the labor force, but was caused by a decrease in the length of the working week, which dropped nationally from 54.9 hr in 1929 to 34.8 hr in 1939."

"EVIDENCE that output per man-hour actually increased is the fact that, in spite of a decline in dollar output per worker, labor costs remained constant or, in some instances, declined. This improvement in utilization of labor was made possible through the use of newer, more efficient plants and through technological innovations. In Los Angeles, wages represented a smaller proportion of value added than in the other areas. The general trend for the 10-year period is slightly upward, with 1937 representing the high point. By 1939, labor costs for this city were again in the favorable sixth position."

Material costs in the Los Angeles area followed the similar trend to those for labor. Although it was slightly upward its comparative position was low and its rating as of 1939 was lowest of all six areas.

It must be remembered that this study of the iron and steel businss was based largely upon the production of heating and cooking apparatus, structural and ornamental metal works and foundry products. There was no consideration given to the primary steel production of Columbia Steel Co. at nearby Torrance and the Kaiser Co., Inc. integrated plant at Fontana 50 miles east of the city which came into production in 1943.

Manufacture of machinery was reported as being the second most favored or most propitious industry for the area as both labor costs and costs for material were relatively low and both factors were moving downward. Paper and allied products production was reported as the most favorable industry.

At the time the study was made Los Angeles ranked fifth in comparison with the other areas reviewed in number of wage earners in machinery production with 10,398 as against Chicago, which during the decade the study covered, held top position of the six areas reviewed with 77,770 employees. It was pointed out that this industry was not under-developed locally in terms of the regions overall manufacturing activity and the prophecy was made by the economists that this industry was likely to continue to expand.

THE authors reported that: "Basically, material costs here were high because West Coast operations in the manufacture of machinery had been chiefly the assembly process, where high-cost, fabricated materials were involved. The downward trend which favored this area during the depression was, to a certain extent, a temporary advantage. It was caused artificially by eastern manufacturers, who dumped material on this market at an unprecedented low price in order to keep prices up in the more active eastern market. However, material costs here did not spring back to their pre-depression level after the crisis, and because of the new steel price picture industrial leaders here can be justifiably hopeful that the downward trend will continue."

"Los Angeles semed to suffer no

TOCCO unit heating bars for shearing slugs. Bars are heated to 1450°F at the rate of 36" per minute. (Photo courtesy of Calumet and Hecla Co.)

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Calumet and Hecla Consolidated Copper Company employs TOCCO induction heating to speed production of mine drill bits. Although your product may not resemble the drill bit shown here, still very likely TOCCO can help to streamline your forging, brazing or hardening operations—and reduce your costs too.

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disadvantage in the manufacture of machinery when compared with the more deeply entrenched eastern areas. What is more inportant is that, as is the case of nonferrous metals, all six areas were growing increasingly similar in their production cost position and, consequently, competition for plant locations was growing more acute among them."

Summarizing their report the economists state that: "Los Angeles more frequently offered advantages to manufacturing industries on the basis of labor cost than on the basis of cost of material. To maintain this advantage in the present decade, this city must continue to strive for increased dollar productivity per worker."

Another economist, David E. Faville, professor of marketing in the Graduate School of Business at Stanford University, recently reported that the West is the richest market in the country on a per capita basis because of its higher individual wealth and because more than 40 pct of the employable population is within the age groups of 20 and 45 years, wherein the urge to acquire possessions is greatest. He further indicated that if and when a slump in national economy occurs, such a depression would not be as severely felt in the West and would be delayed in reaching this area because of the larger unsatisfied demand for homes and consumer goods.

Another favorable factor in the long range economy reported by this analyst was the heavy expenditure for new plants and expansions in this area which is being stimulated and supported by a heavy influx of new residents.

* * *

SAN FRANCISCO — Typical of the trend to establish industrial plants in small communities in the West is the venture of Victor Industries Corp. of Calif., which has just completed the first plant for the manufacture of collapsible metal tubes on the West Coast at Chico north of this city.

While the operation itself is not large it is extremely important to this small community of 12,000 population and represents an investment of approximately $1/4 million of machinery and equipment.

Small aluminum slugs are converted into ordinary "squeezable" tubes for containing tooth paste, shaving cream, glue, oil, grease and even food. The operation has been set up in one of the large buildings originally built for the Chico Army Air Base which has recently been acquired by the city of Chico for its Municipal Airport and to provide an industrial section.

Victor Industries is a subsidiary of Victor Industries Corp. of Brooklyn, N. Y., which is the world's largest producer of collapsible tubes and the western venture was undertaken to improve service and delivery to customers in this area and overcome losses in shipping on a 13 to 15 day trip by rail from the East Coast plant.

Initial output with approximately 60 employees will be between 80,000 and 85,000 tubes per day with an ultimate production goal of 150,000 to 155,000 tubes daily.

The tubes are extruded from aluminum slugs at present shipped here from the East although a western source is reportedly being sought. At present tool steel for the dies is being supplied by Bethlehem through Earle M. Jorgensen warehouse.

Lone Star Steel Co. Planning to Acquire Finishing Facilities

Dallas

• • • **At a directors** meeting of the Lone Star Steel Co. held at Daingerfield, Tex., on Apr. 29, E. P. Germany was re-elected president of the company. He was authorized to negotiate loans not exceeding $20 million for the purpose of retiring outstanding debts and acquiring additional plant facilities including facilities for the manufacture of steel.

The company plans immediately to acquire steel making and rolling equipment and hopes to be in the production of pipe and tubing as quickly as possible. Research conducted by the company indicates that 80 pct of the oil steel casing and pipe line material that is to be used in the United States during the next 10 years will be used within a 400-mile radius of the Lone Star Steel plant.

Tentatively, the steel production plans call for 15,000 to 20,000 tons per month. The balance of the iron production not taken up by steel manufacturers would still be available for local foundries in the area.

At the directors meeting John W. Carpenter was re-elected chairman of the board. Elected to the board's executive committee were E. P. Germany, Nathan Adams, R. L. Thorton, Fred Florence, and Raleigh Hortenstine, all of Dallas; V. A. Clements, and Clifton W. Brannon, Longview; C. E. Owen and Watson Wise, Taylor. Mr. Germany was elected chairman of the executive committee. Other officers elected were Raleigh Hortenstine, vice-president; and George D. Ramsay, vice-president and general manager.

A program under which employees may purchase stock was also authorized at the meeting. Forty thousand shares of treasury stock were set aside for this purpose, whereby each employee may purchase up to $1000 worth at book value as of Apr. 30, 1948. Each employee will be given by the company an additional amount of 50 pct of his purchase.

Seamless Tubes By Extension Seen By Pittsburgh Engineer

Pittsburgh

• • • **Recent experiments** and developments point to considerable advantages and economies in making seamless tubes by extrusion, according to A. F. Kritscher, development engineer, National Tube Co., Pittsburgh. High alloy tubing will probably be made by this method, he said, in a recent talk here before the American Society of Mechanical Engineers.

It is believed, the tube company engineer continued, that carbon steel tubes can be made in sizes as small as 2-in. OD with min (0.079-in.) walls in lengths up to 50 ft., and stainless steel tubes with 3-in. diam and 0.117-in. (min) walls in lengths up to 30 ft.

Since this can be accomplished with a 4 to 5 man operating crew and with an investment considerably less than by present mills, Mr. Kritscher asserted that the process appears to have great potentialities. It is also likely that alloys which are unpierceable with the modern piercing mills can be successfully processed.

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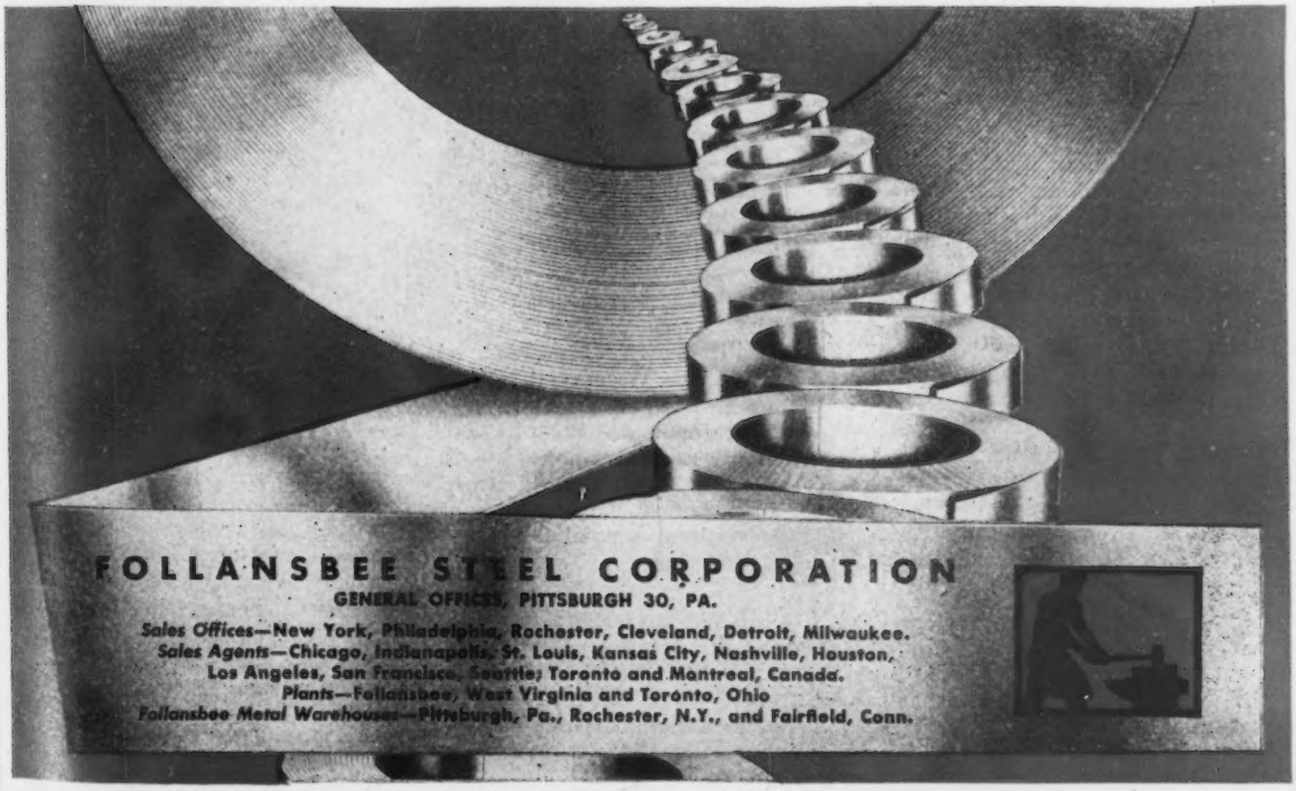

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***Follansbee Metal Warehouses*—Pittsburgh, Pa., Rochester, N.Y., and Fairfield, Conn.**

PERSONALS

o o o

• **Orlan Johnson** has been elected president of the Gifford-Wood Co., Hudson, N. Y., succeeding the late Benedict Gifford. Since leaving the service in 1946, Mr. Johnson has been employed by the Gifford-Wood Co. in its New York office as sales engineer. Other officers elected are as follows: **J. S. Carswell,** vice-president; **T. J. Twining,** treasurer; **W. E. Herb,** secretary, and **W. Thorning Wood,** assistant secretary.

• **Allen W. Lovell,** general manager, has been elected vice-president of Modern Collet & Machine Co., Ecorse, Mich. He joined the company as sales manager in 1944 and was appointed general manager in 1946.

• **Russell M. Braund** has been appointed comptroller of American Steel & Wire Co., Cleveland, succeeding M. W. Field, deceased. **John W. Jordan** has been named assistant comptroller, with added responsibilities. Mr. Braund joined the U. S. Steel organization in 1931 as a field auditor with Oil Well Supply Co. He held a number of positions with that organization, and had attained the rank of comptroller at the time of his appointment as assistant comptroller of American Steel & Wire Co. in 1944. Mr. Jordan joined Carnegie Steel Co., a U. S. Steel subsidiary, in 1933, and joined American Steel & Wire in 1943 as supervisor of the cost planning division. Since 1944 he has been assistant comptroller in charge of the cost planning and statistical division.

• **John W. Crossett** has joined the development and research division of the International Nickel Co., Inc. at New York. He will follow railroad development work and succeeds the late **Frederick P. Huston** in that capacity. For the past 11 years Mr. Crossett has been connected with the Chicago, Milwaukee, St. Paul & Pacific R.R.

• **William H. Attschuler** has been appointed vice-president in charge of manufacturing of Shure Bros., Inc., Chicago. He became associated with the company in 1945 as factory manager.

• **W. F. Sewert** has been appointed manager of hardware products for the Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York. He has been with the company since 1923.

HOWARD M. HUBBARD, president, Hydraulic Press Mfg. Co.

• **Howard M. Hubbard** has been appointed president of the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, filling a vacancy created by the previous resignation of H. A. Toulmin, Jr. Mr. Hubbard has served as president of the Elliott Co. and the Greenfield Tap & Die Corp. He has also served in the capacities of controller, secretary and treasurer and company director of Harris-Seybold-Potter Co. For the past 3 years he has been self-employed as a consulting and development engineer.

• **Hampson Carey,** assistant treasurer of Jones & Laughlin Steel Corp., Pittsburgh, since 1942, has been elected treasurer. **W. C. Plummer,** who has been employed as an attorney since 1920, has been appointed general counsel of the corporation, and **J. T. Ross,** a member of the legal department since 1940, has been appointed assistant general counsel.

• **John W. Lawler,** district manager of the American Car & Foundry Co.'s St. Charles, Mo. passenger car plant since 1922, and **James L. Mahon,** district manager of the ACF Detroit plant, have retired.

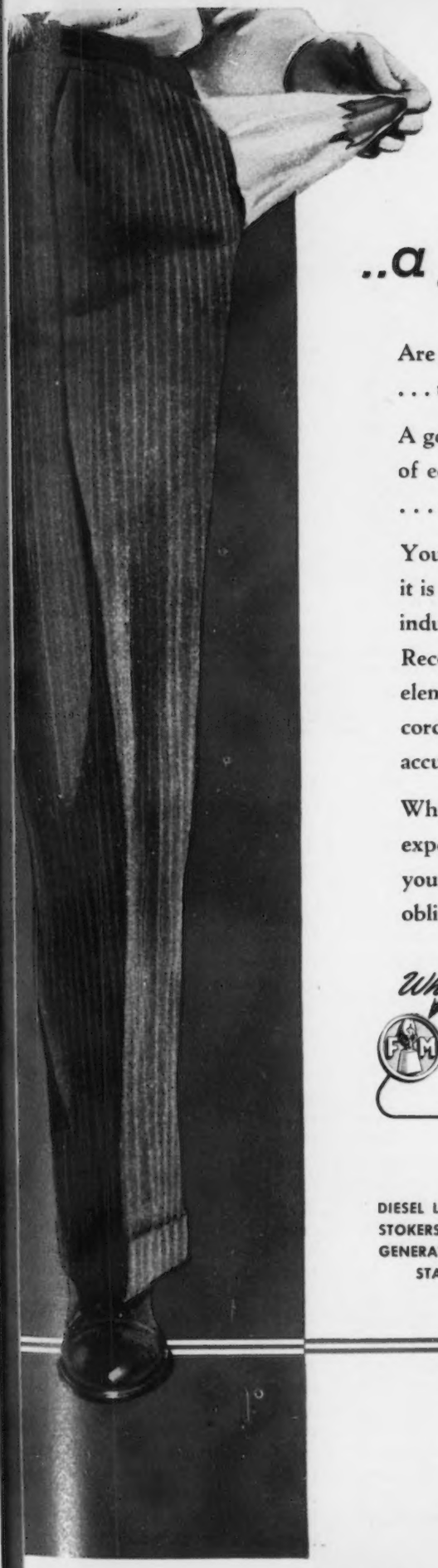
• **W. F. Detwiler,** who has been chairman of the board of directors, Allegheny Ludlum Steel Corp., Pittsburgh, for the past 10 years, has been named honorary chairman, and **Lester H. Bittner,** director of purchases, has been elected to the newly-created position of vice-president in charge of purchases. Mr. Detwiler served in positions ranging from maintenance engineer to company president. He became chairman of the board of Allegheny Ludlum Steel Corp. when Allegheny and Ludlum were merged in 1938. He will remain a director as well as honorary chairman. Mr. Bittner joined an Allegheny Ludlum predecessor, Atlas Steel Co., now the company's Dunkirk, N. Y. plant, in 1920 as purchasing agent. He returned to Pittsburgh in 1942 when he assumed his position as director of purchases.

• **R. M. Hillman** has been named assistant treasurer of the Pittsburgh Steel Co., Pittsburgh. He joined the company in 1937 as a sales student. **G. Herbert Keisling** has been elected assistant comptroller of Pittsburgh Steel. Mr. Keisling joined the company in 1926 as clerk in the sales analysis division, was named assistant auditor in 1944 and auditor in 1946.

• **W. O. Mitchell** has been appointed plant manager and engineer of the Shiffler plant of American Bridge Co., Pittsburgh. He succeeds **H. B. Hill,** who has retired after 44 years of service. Mr. Mitchell began at the company's Ambridge plant as a draftsman in 1937. During the war he worked at the company's Ambridge shipyard in the industrial engineering department.

• **Paul J. Bowron,** assistant manager of industrial relations, Tennessee Coal, Iron & R.R. Co., Birmingham, has been named superintendent of the company's Fairfield, Ala. sheet mill. Mr. Bowron succeeds **Reginald E. Sturdy,** who has been named staff assistant in the office of C. R. Bottenfield, general superintendent of the Fairfield sheet and tin mills. **Elmer F. Harris,** former assistant to Mr. Bottenfield, has been appointed assistant general superintendent of the two mills. **Roman J. Meyer,** formerly superintendent of the hot strip mill at Fairfield tin mill, has been named assistant superintendent of Fairfield sheet mill.

(CONTINUED ON PAGE 142)



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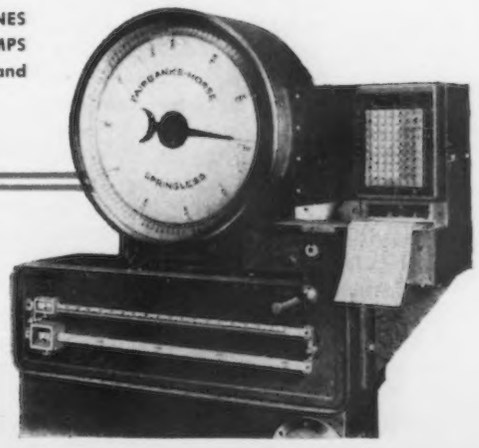
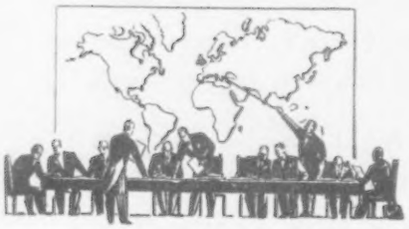


European Letter . .

• Japan greatly benefited by American supremacy . . . No prospect of immediate peace treaty seen due to Russian insistence on the framing of the treaty . . . Withdrawal of forces unlikely for long time.



LONDON—Troubles of the kind that arise from the quadrisection of Germany do not afflict Japan. All Japan is one zone subject to the supreme authority of the Supreme Commander of the Allied Powers. The Allied Powers are indeed mentioned in this magnificent proconsular title, but that is as far as they have ever got in controlling Japan. At the time of the surrender, the United States insisted, overriding Russian objections, on holding an undivided command in the occupation of Japan.

The American insistence was not at that time due to conflict with Russia, but simply to the preponderant part played by American forces in the final victory over Japan, the relative shares of the principal allies in the decisive war effort having been altogether different in the Pacific from what they had been in Europe. Later on, however, as Russo-American relations deteriorated, the American supremacy in the control of Japan came to be valued in Washington more and more as a means of excluding Russian interference from Japanese affairs. Formal concessions were made to the principle of joint allied responsibility by instituting the Far Eastern Commission in Washington and the Allied Council in Tokyo, but neither of these bodies has succeeded in being more than a mere critical spectator of the activities of SCAP.

The benefit to Japan has undoubtedly been very great, for Japan has retained national unity and uniformity of administrative policies and has escaped the divisions which have split Germany, Austria and Korea. From the American point of view the policy of exclusive control has worked well, in spite of the burden of unshared relief on the American budget, for Japan has been kept intact on the right side of the Iron Curtain. For the same reason it has given substantial satisfaction to other Western Powers and to China. Nevertheless, it has been in many ways irksome, even to those nations which share Washington's desire to insure that Japan does not catch the Communist infection.

THE fact is that there is no prospect of a peace treaty with Japan in the near future. Russian insistence on the framing of the treaty by the Council of Foreign Ministers is quite unacceptable to the United States, for it would enable Russia by obstructive use of the veto to impose terms which could not be obtained under present conditions. In the American view, which has been hardening in recent months, Russia has already been handsomely overpaid for its 1-week campaign at the end of the Pacific war, and to submit American proposals to Russian veto blackmailing would merely mean, either bribing Russia to sign the treaty or having to break up the conference after a prolonged wrangle

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But, if there is not going to be a peace treaty, the present legally indeterminate state of affairs must continue, only with more and more irrevocable decisions being taken *de facto* by American policy. The Americans have the real power and the equally real liability in Japan, and the indications are that they are not going to wait for the ever-receding peace conference before decisively arranging matters which will shape Japan's future.

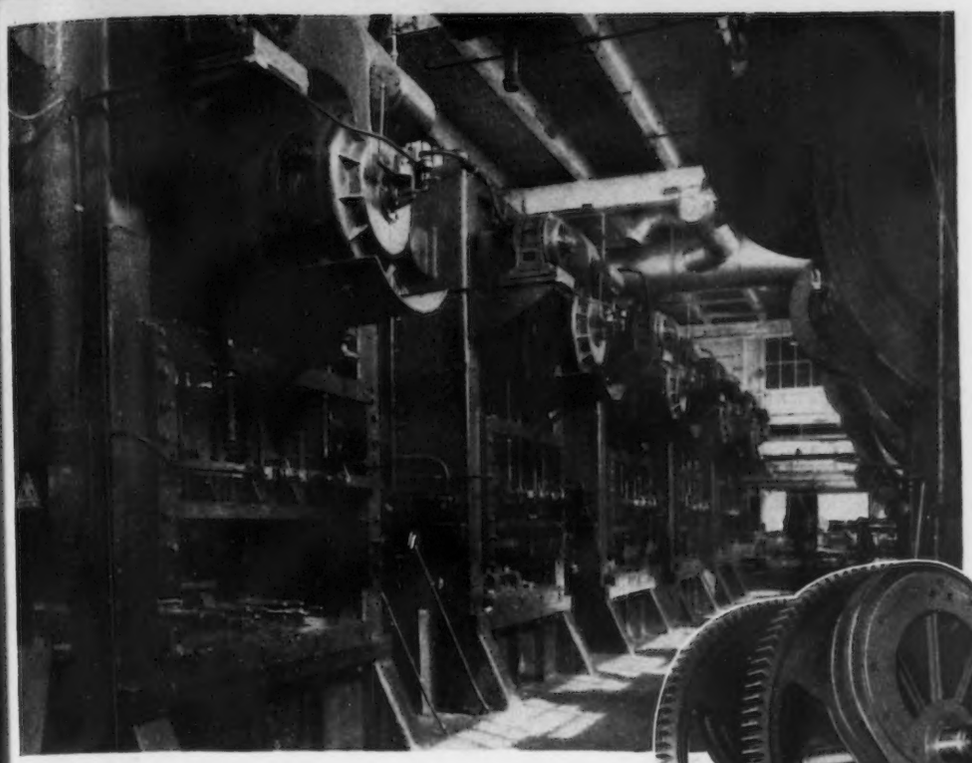
The United States may be influenced in its decisions by representations from friendly governments with interests at stake, but there should be no doubt that the real decisions of policy will be taken in Washington—and not by the Far Eastern Commission that meets in that city.

AS regards the occupation itself, there has been much talk in America of bringing it to an end and substituting a purely civilian control, with forces held in reserve somewhere in the Pacific to re-enter Japan in case of need. But it is very unlikely that such a withdrawal will be carried out for a long time to come. The problem is not merely that of the good behavior of a disarmed Japan in relation to its conquerors. The very disarmament and demilitarization of Japan is a source of danger. Having created a vacuum of military power in Japan, the Americans in withdrawing would take the risk that someone else might step in by a process of armed infiltration.

To cope with the problem of internal order the Americans have been expanding the Japanese police force, and have recently authorized an armed coastguard service in defiance of Russian protests.

Given the stability which can be insured by continued American occupation, the problems involved in Japan's economic rehabilitation should be discussed with the United States by Britain, Australia and other interested countries within the framework of an extended Marshall Plan for world trade recovery. If western Germany is to be included in the scheme of Marshall aid and contribute to international trade, Japan cannot indefinitely be treated otherwise.

Japan's business efficiency, technology and productiveness can be immensely helpful in world economic revival, and agreement with the United States can insure that they are directed in such a way as to cause the minimum of damage to other trading interests which the logic of the Marshall Plan requires America also to promote.



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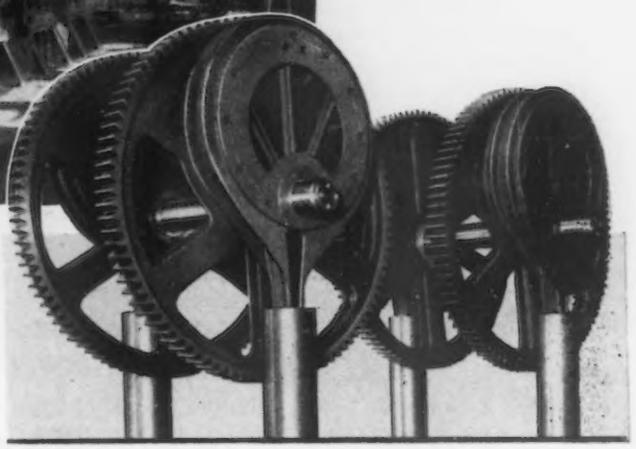

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Industrial News Summary...

- **F.o.b. Mill Spectre Scares users**
- **Some May Move to New Locations**
- **Price Confusion Extends to Mills**

HIGHER freight rates and agitation by governmental agencies against the basing point system are driving some steel users to seriously consider moving their plants. So far some of the plants planning to move to steel centers are small ones. But this may presage a wholesale trend later. Thus when the safety of the country demands a general move towards dispersion of industry, government aims and stiff freight rate changes are causing or are likely to cause just the reverse—concentration near large steel areas.

At least three steel fabricating plants have consulted steel firms in the past week on the question of moving their plants. Steel users remote from source of steel are in a bad way. Steel firms are tightening up in freight absorption sales because they can not stand the cost, which is too great. With heavy demand, due to last for at least another year, there is enough business in their own backyard to keep steel companies from worrying about going far afield for orders.

The seizure of the railroads by the government has caused some steel people to fear another freight hike later. This is on the assumption that the government may be forced to settle the wage controversy—an act which would likely be followed by approval of higher rates to support the increased cost to the roads.

Such a move could only aggravate a situation which is already acute and is forcing mills to (1) use water or trucks to move steel wherever possible, (2) chop off customers who are too far from the mill when the sale means meeting competition by freight absorption and (3) pay more for raw materials used in steelmaking.

More ominous to the steel industry is the information obtained by IRON AGE that the chief legal aid for the Federal Trade Commission is working on a cease and desist order to present to the commission for approval. If present intentions are carried out an order on steel firms to (1) establish an f.o.b. mill price policy, (2) abandon the basing point system of selling steel, (3) conform to the Supreme Court decision in the Cement Case and (4) cease other practices attached in the FTC case against the steel industry is likely.

IF such an order is approved by the commission—and there is no reason to believe it won't be—the steel industry will face the basing point dilemma far sooner than any of its legal minds had supposed. It is expected that such an order will be fought in court and, if necessary, in the Supreme Court, but there are many steel officials who see their present selling practices doomed because of the Cement Case.

Certain to be hit and confused by the present trend in steel marketing practices are steel consumers. Those near steel centers appear to be well off—but this is poor comfort if they can not get the kind of steel they want in their own area. Users far from any steel center will pay through the nose with high freight rates to their plants under an f.o.b. mill system. This they would gladly do if only to escape gray market prices but at present demand for steel is far above supply, so their chances to get mill priced steel are not always good.

Steel users about half way between steel centers seem this week to be in a fairly good position—for the long pull. When supply passes demand it is likely that these fortunate steel consumers will be able to benefit from competition between steel centers. But there is no assurance that so-called "normal" conditions will ever return—to the exact status prevailing before the war.

STEEL firms which have pulled out of distant markets may come back to them when demand falls off. But there is no assurance that any steel firm will absorb freight in any way near the amount that was done in the '30's—for one thing steel costs are too high and the break-even point too high to expect this. It is doubtful that any steel firms will want to go any higher than $1 to $1.50 a ton freight absorption average—it being assumed that even if the FTC does outlaw the basing point system mills will still absorb freight, but not on a uniform or systematic basis.

The steel marketing problem is far more serious than appears on the surface. There was not a large steel mill last week whose offices were not still poring over and debating the probable effects of the cement decision. To complicate maters further these same officials were attempting last week to find out what each was charging for steel. Most large companies have announced new steel prices—but on many items action has not yet been taken. In major basing point areas THE IRON AGE has been forced to publish a range in the prices of all major products—because there are from two to four different quotations.

The Chrysler auto strike will not mean more steel for other auto makers. Steel is moving for Chrysler to warehouses where it will be stored and used when the strike ends. This policy was used by GM when their plants were struck a few years ago. Attempts by other steel users to get steel originally ordered for shipment to Chrysler plants will not succeed.

The steel ingot rate this week struck a slow motion snag when it advanced only ½ a point to 94.5 pct. The momentum of recovering from the coal strike has run out and it will be hard to get the rate up to 97 pct before another week or so.

It now appears that the full loss of steel due to the coal strike will run about 1,650,000 tons—quite a price for the industry to pay for being perennially vulnerable to John L. Lewis' periodic mine shutdowns. More than 20,000,000 tons of ingots have been lost since the end of the war due to coal strikes, a steel strike, and bad weather.

• **LEGAL SNUB**—Resentment of trade association executives over the legal snub resulting from the ruling of Attorney General Tom Clark that they should not be members of industry advisory committees or act as observers at meetings of such committees, is evidenced by the letters of protest which they have addressed to Senator Taft, author of the anti-inflation legislation which provides for the committees. The trade association executives, spearheaded by Tom J. Smith, president Pressed Metals Institute, maintain that "competitors are not going to delegate to a limited number authority to hold star chamber sessions on matters pertaining to the entire industry, unless their trade association representatives have entree to these meetings in which these committee activities are proceeding."

• **FORD FIRST**—Early in July Ford will start production of oxygen at the Rouge in a plant to be operated by Air Products, Inc. Production capacity is 15 million cu ft of oxygen and 54 million cu ft of nitrogen a month. Oxygen will be piped into the Rouge distribution system principally for welding, scarfing, cutting scrap and in die construction. It is the first such plant in the auto industry.

• **MORE NAILS**—Manufacture of barbed wire in Canada is being suspended and wire for other purposes, such as agricultural implements, drastically cut. The result of this saving in raw materials will be diverted to the production of nails. Although Canada is producing more nails today than ever before, complaints about nail shortages continue, and grow. In March of this year production of nails reached 142,400 kegs (100 lb), as against 130,480 kegs for the same month last year. In commenting on the action, Reconstruction Minister C. D. Howe said, "This is the only way to get more nails." "I should like to go full out and fill every hardware store with nails and get people complaining about something else for a while."

• **CANADIAN INCREASE**—Dominion Steel & Coal Co. has advanced prices 35¢ per 100 lb on nails, wire, bale ties, reinforcing steel, drift bolts and bedstead angles. The advance in prices has not been reported by other Canadian steelmakers. Canadian steel producers opened their books for third quarter orders a few days ago, and now report production capacity filled on most materials to the end of September.

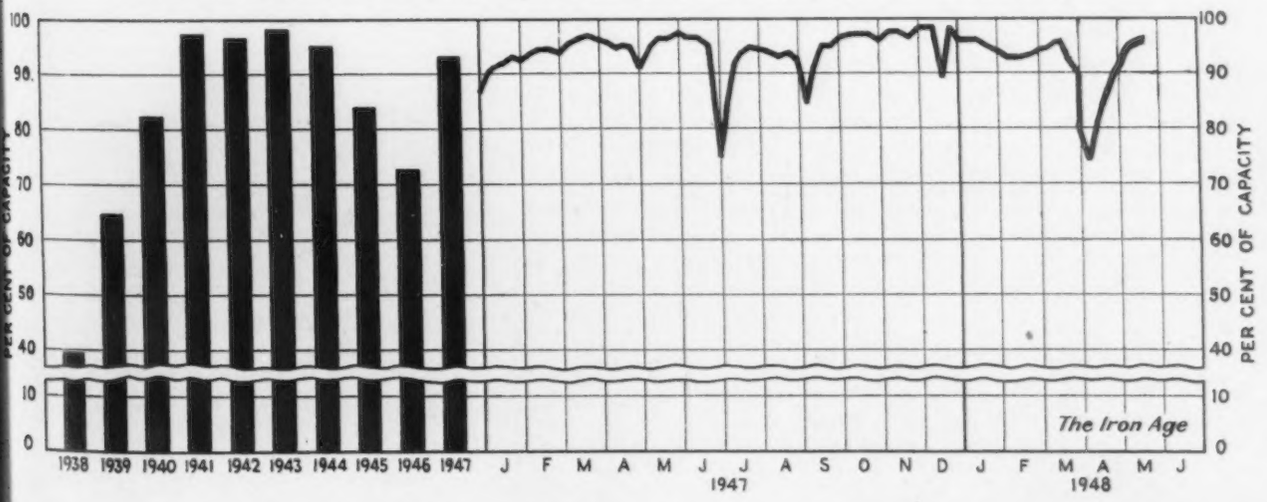
• **SPARROWS POINT BASE**—Bethlehem Steel's announcement of a cold-rolled sheet base at Sparrows Point landed with a dull thud on Pittsburgh producers. It means —at current prices—a stiff increase in freight absorption if Pittsburgh mills are to continue to sell this product in the East. Shipping to Newark, N. J., when Buffalo was the governing basing point meant an absorption at former prices of only 60¢ a ton. Today, with Pittsburgh producers charging $69 and $70 a ton against a Sparrows Point price of $71, the absorption is either $1.60 or $2.60 depending on the producer. Many steel users around New York will now pay about $3 a ton less for cold-rolled sheets.

• **WESTINGHOUSE CUTS**—Since the first of the year Westinghouse Electric Corp. has announced price reductions totaling over $14 million. Approximately two-thirds of this reduction went into effect during the last week in April. Among products which were cut about 5 pct are small motors and transformers, switchgear apparatus, radios and two models of refrigerators and electric water heaters. The company added that a majority of the items cut were still at peak demand.

• **STEEL PAYROLL**—The total payroll of the iron and steel industry in March, 1948, reached an all-time high, and total employment reached a postwar peak, according to the American Iron and Steel Institute. The payroll for wage earners and salaried workers totaled an estimated $183,045,000, compared with a previous peak of $180,253,000 in January, 1948. Wages alone during March amounted to $148,310,000. Employment during March was estimated at 628,800 wage earners and salaried workers. That figure includes 535,200 wage earners.

• **SOUTHERN IRON RAISED $3**—Woodward Iron Co. raised its pig iron prices $3 a ton effective May 14, and Sloss-Sheffield Steel & Iron Co. followed with an equivalent increase effective May 16. This action brings the prices of these Birmingham producers up to the level of Republic Steel Co.'s prices at Birmingham. Information obtained from several other districts indicate that producers are studying the need for pig iron increases because of higher coke and ore prices and other advancing costs.

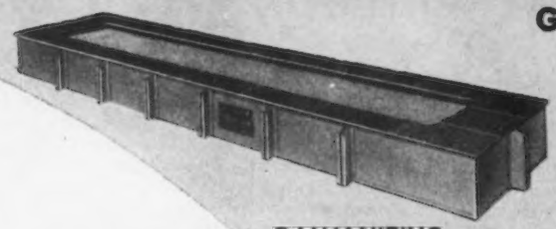
Steel Ingot Production by Districts and Per Cent of Capacity



of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
	98.0*	93.0	90.5*	90.0	95.5*	93.0	104.0	98.0	102.0	85.0	96.5	89.5	98.0	94.0*
	98.0	93.5	91.5	90.0	97.5	93.0	103.0	102.0	102.0	87.5	99.0	78.0	98.0	94.5**

THERE IS A SUNBEAM STEWART INDUSTRIAL FURNACE FOR EVERY NEED

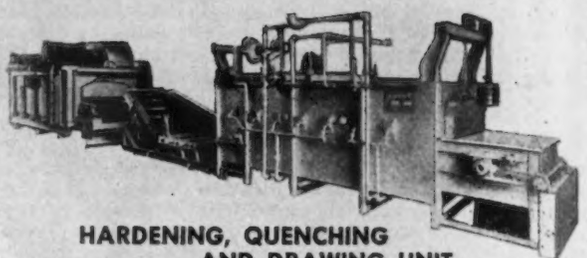
GAS • ELECTRIC • OIL



GALVANIZING

Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE



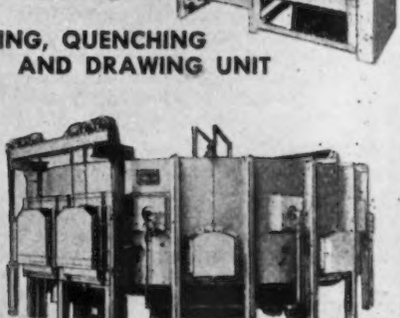
HARDENING, QUENCHING AND DRAWING UNIT

- ***Longer*** **furnace life** • ***Greater*** **production**
- ***Lower*** **operating cost**

As a division of Sunbeam Corporation we have the opportunity of working with our furnaces in the production of Sunbeam appliances, lawn sprinklers, sheep shears, animal clippers, etc. In manufacturing our own products we must contend with practically every heat treating problem faced by industry —a position unique in the furnace manufacturing field.

This experience with our own furnaces in large volume production enables us to render a service to you far beyond other manufacturers. That is one reason why Sunbeam Stewart Furnace installations have been so successful. They are based not only on furnace engineering ability, but on practical experience under actual operating conditions. We have learned through actual experience the factors that give longest furnace life . . . greatest production . . . best quality . . . and lowest operating cost.

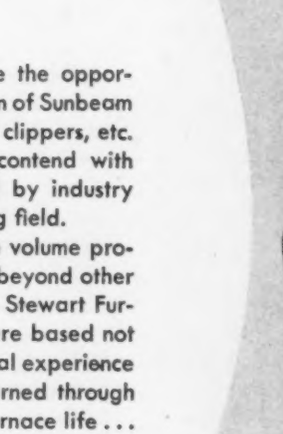
Our highly trained technical staff of furnace engineers who for over 50 years have built furnaces for the leading companies throughout the United States and abroad are qualified to recommend the correct type of furnace to meet your requirements.



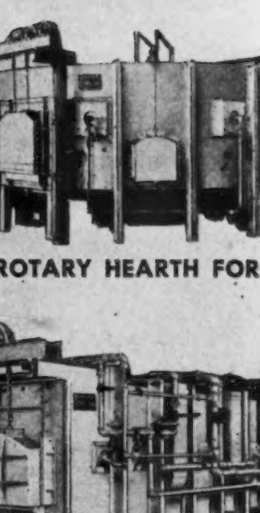
ROTARY HEARTH FORGE

PORTABLE OVEN FURNACE

A letter, wire or 'phone call will promptly bring you information and details on Sunbeam Stewart Furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a Sunbeam Stewart engineer will be glad to call and discuss your heat treating problem.



RECIRCULATING FURNACES



SEMI-MUFFLE AND FULL MUFFLE OVENS

SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION of SUNBEAM CORPORATION

(*Formerly* CHICAGO FLEXIBLE SHAFT CO.)

Main Office: Dept. 110, 4433 Ogden Ave., Chicago 23—*New York Office* 322 W. 48th St., New York 19—*Detroit Office:* 3409 E. Grand Blvd., Detroit 2

Canada Factory: 321 Weston Rd., So., Toronto 9

Rail Rate Raises Chase Midwestern Shippers to Illinois Waterway

Each Rail Freight Increase Widens Spread Between Rail, Water Rates

By D. I. BROWN
Chicago Regional Editor

Chicago

• • • **Every rail rate** increase chases midwestern steel shippers closer to the hottest transportation line in the country—the Illinois Waterway. So far steel products have not been a major tonnage item, but the last rail rate increase plus the pending further requested increase of 11 pct has caused steel mills and consumers to get out their geography books and minutely restudy the possibilities of using water shipments.

The decentralization of steel consuming industries may well change to one of concentration along navigable waterways. Consumers are now much more conscious of freight charges because of the possibility that delivered prices, or the basing point system, may be thrown out. If it is, they will be paying a larger share of the freight bill, or all of it, depending on how the FTC cement case ruling is applied to the steel industry.

A record tonnage of almost 10 million net tons moved over the Illinois Waterway last year. This system, which carries more tonnage than the Panama Canal, is daily becoming more important to the steel industry located in and around the nation's best situated inland port—Chicago.

With every railroad freight rate increase, the spread between barge rates and freight car rates has widened in favor of water transportation (see table). Last year's tonnages of "iron and steel manufactured" is not yet available. In 1946, 99,473 net tons of this class of material was carried. Wisconsin Steel, International Harvester Co. and Inland Steel are the biggest steel customers using the system, but recently the others have started to restudy the possibilities of saving money by shipping in barges.

The chief reason steel shipments out of the Chicago area have not been heavier is the steel shortage. Consumers can't wait for a barge load of 500 ton minimum loads. Carload lots are handled by the Federal Barge Co. (U. S. government owned) and are about 20 pct cheaper than all rail but the best savings in water travel are found in bulk movements with no rail connections necessary.

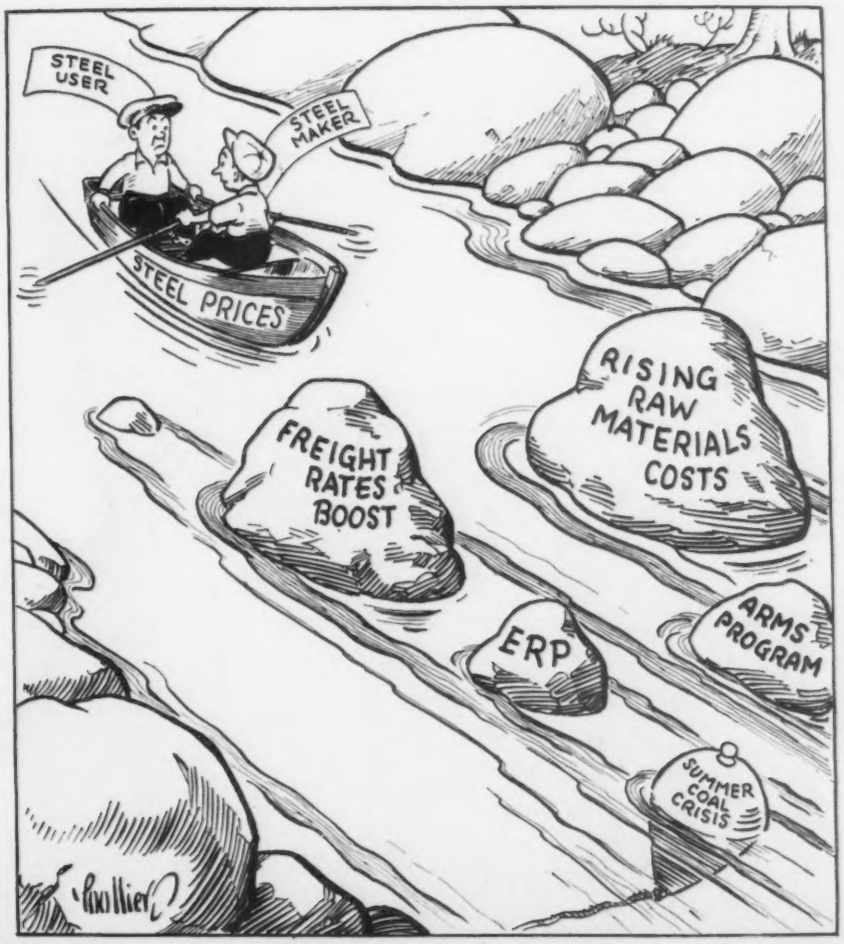
One steel company reported that its barge shipments usually don't take any longer, port to port, than all rail. Herein lies the rub. If the steel plant can't load directly into a barge and the consumer unload directly from the barge into its plant, freight car switching or truck handling at one or both ends increases the time and costs. Handling costs vary widely depending on who quotes on the job.

In Chicago one steel company reported loading and unloading costs per net ton on identical shipments varied from 60¢ to $1.75, and that in many cases these extras are keeping would-be shippers off the rivers. The time element (so important now) will not always be present so that future barge shipments of steel from Chicago to points near or on the inland waterways will increase if the present rail rates are still in effect.

Once warehouses or steel consumers obtain ordinary inventories, the barge companies, it appears, are going to be up to their necks in new steel business. At present a barge shortage is being experienced. Washington has been asked to get the mills to allocate more steel for barge construction, but so far they have not been successful.

With the largest tonnages mov-

Rocks Ahead



83-MILLION DOLLAR IMPROVEMENT PROGRAM ON CALUMET-SAG CHANNEL WOULD GIVE ALL MILLS DIRECT TIDE WATER CONNECTIONS. FROM 1937-

TONNAGE CARRIED ON ILLINOIS WATERWAYS INCREASED BY 285 PCT DESPITE LIMITED CALUMET-SAG FACILITIES

CHANNEL DIMENSIONS

LOCATION	DEPTH (Feet)		WIDTH (Feet)	
	PRESENT	PROPOSED	PRESENT	PROPOSED
CHI. RIV. TO LAKE ST.	21	NO CHANGE	200-300	NO CHANGE
CHI. SAN. AND SHIP CANAL LAKE ST. TO SAG JUNCTION	21	NO CHANGE	160	NO CHANGE
CHI. SAN. AND SHIP CANAL SAG JUNCTION TO LOCKPORT	21	9	160	225
CAL-SAG CHANNEL-SAG. JUNC. TO LITTLE CAL. RIVER	21	9	36-60	225
LITTLE CAL. AND CAL. RIVERS CAL. SAG. CHANNEL TO T.B. NO.5	9	NO CHANGE	300	NO CHANGE
CAL. HARBOR AND RIVER-T.B. NO.5 TO LAKE MICHIGAN	21-26	NO CHANGE	200(Min)	NO CHANGE
GRAND CAL. RIVER-LITTLE CAL. RIVER TO IND. HARBOR CANAL	3-4	9	100	225
GRAND CAL. RIVER-IND. HARBOR CANAL TO CLARK ST.	3-4	9	100	160
IND. HARBOR CANAL-GRAND CAL. RIVER TO 141 ST. ST.	3-4	9	100	225
IND. HARBOR AND CANAL	20-26	NO CHANGE	200(Min)	NO CHANGE

1946 VESSEL FREIGHT TRAFFIC (Tons)

COMMODITY	SO. BRANCH CHI. RIV. (PORTION OF ILL. WTWY.)	CHI. SANITARY AND SHIP CANAL (PORTION OF ILL. WTWY.)	CAL-SAG CANAL (PORTION OF ILL. WTWY.)	ILL. WATERY CONSOLIDA
SAND, GRAVEL AND STONE	879,187	780,956	92,369	1,296,8
SULPHUR	124,673	232,195	0	341,3
PETROLEUM PRODUCTS	58,047	663,934	9,750	1,016,3
COAL	1,604,756	2,435,861	305,454	3,143,2
MOULDING SAND	0	61,651	18,612	48,4
GRAIN	0	559,535	580,285	680,9
CEMENT	0	0	0	42,5
IRON OR STEEL MFD.	0	98,817	64,067	99,4
ALL OTHERS	148,445	338,193	23,249	244,2
TOTALS	2,815,108	5,171,142	1,093,786	6,913,7

"PRELIMINARY AND SUBJECT TO REVISION"
"IN REPRODUCING, WHOLLY OR IN PART, DATA CONTAINED HEREIN INDICATE SOURCE, CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY"

NOTE: ESTIMATED POTENTIAL TRAFFIC OVER CALUMET-SAG CANAL WITHIN 5 YEARS AFTER COMPLETION-9,000,000 TONS. ULTIMATE-18,000,000 TONS

ing upbound such as coal, petroleum products and sulfur, at present there is plenty of space on downstream hauls. Steel products, farm implements and pig iron are downstream naturals, particularly on long hauls to southern or southwestern markets or export consignments.

Upbound shipments of scrap are increasing. The barge rate on 500 net ton minimum quantities in one case from New Orleans to Chicago on scrap is $6.42 a net ton compared to $10.73 all rail.

One steel producer reported, however, that they save only 1.81 a ton on such movements of scrap where direct loading into the barge and direct unloading at the mill is not possible. Comparable water and rail costs, on any item between different points are difficult to evaluate.

Special rail rates on certain commodities plus the fact that barge rates vary widely, as contract haulers don't always use published rates, along with the different handling problems encountered and combination rates such as rail-water-rail or water-truck, make general comparisons difficult. In cases of joint or combination rates, the picture is further complicated by in-transit rates with stopover privileges.

One fact is certain. Chicago is in a much better position to supply steel to points economically feasible to reach by our main inland waterways system than is the other steel producing center, Pittsburgh. It is 440 miles less from Chicago to New Orleans than the water route from Pittsburgh to New Orleans. This saving in mileage occurs between Chicago and Cairo, Ill. The Chicago run employs only eight locks, all modern, 600 ft x 110 ft x 14 ft.

On the Pittsburgh run, barges encounter 48 locks, except during high water when they encounter fewer locks but considerably more flotsam. Barge rate on steel products from Pittsburgh to New Orleans is $5.51 a net ton. Chicago to New Orleans, $4.55 a net ton. On the average all rail shipments Chicago to New Orleans take a week, barge takes 2 to 3 weeks.

If the Calumet-Sag Channel (see map) is improved, steel producers and users can really start to take advantage of water. Congress has authorized the project but has not yet approved the funds. Large barges now have to be routed through the downtown Chicago outlet, where tugs take over and complete the lake haul to Gary, Indiana Harbor, South Chicago, etc.

If the Sag shortcut to the mill area is completed, the lake movement of barges will not be necessary and water hauling costs will be cut appreciably. Steel customers and producers could do well to get behind the development lest it becomes a pork barrel politico football.

Points that can be reached by Chicago steel shippers today are large market areas. However, some do not have the best water transport facilities. Houston, New Orleans and the Gulf Coast are cheaply reached. Any point on the lower Mississippi River is easily accessible, but the upper Mississippi and the Missouri River aren't too good.

As an example, last month 400 tons of tinplate were shipped from Gary works of Carnegie-Illinois Steel to a user in St. Paul. Gary dock facilities for barges are not good. Only during certain periods of the year does the company attempt to bring barges into the Gary slip.

The tinplate was loaded on freight cars at Gary, shipped to the Federal Barge dock at West 31st St., Chicago, unloaded into barges and then sent down the Sanitary Canal and Illinois River to Alton, Ill. From there the barge was pulled up the Mississippi to St. Paul.

Even under these conditions the barge was cheaper than all rail. The big bottleneck on water movement from Chicago to the Minneapolis-St. Paul area is the lack of a modern short line connecting link from the Upper Illinois River to the upper Mississippi River. The link is already there, but it is a weak link.

This 75 mile long antiquated ditch, called the Hennapin Canal, offers the possibility of saving 471 miles on the Chicago to Minneapolis run, but the Hennapin is practically unusable. Its 32 locks are hand operated, the draft varies from 4 to 6 ft depending on the season of the year, special small barges and towboats must be used and a 24 hr notice to the U. S. Engineers office in Rock Island are just some of the hurdles.

Steel consumers in the Omaha area have recently started to investigate barge possibilities. This means the use of the Missouri River, which river men say cannot be considered a navigable stream, the popular opinion notwithstanding. Federal Barge Co. services the area, but the other operators don't —claiming they can't afford to operate at a loss on this waterway.

See page 122 For Canadian Steel Outlook.

Should the St. Lawrence Seaway project materialize, Chicago would become even more important as a port area. Without this break the Chicago area is destined to become more than ever the Distribution center of the country, particularly if the Calumet-Sag project materializes.

The steel industry cannot readily move, but steel consumers have and will continue to do so. Future movement, it appears, may not be one of general decentralization spread all over the country. Rather the decentralization program in the Midwest may change to a concentration of steel consuming plants along navigable waters on or connecting with the Illinois Waterway.

Transportation Costs on Iron and Steel Products From Chicago to Consuming Areas

Latest Rates in Dollars per Net Ton

	Min. 500 ton barge loads	Min. 40,000 lb carload lots		
	All Water (Barge) Terminal to Terminal Only	All Water (Barge)	Rail & Barge (Joint Rate)	All Rail
St. Louis	$1.27	$6.00	$6.20	$7.60
Kansas City, Mo.	4.18	9.60	none	12.00
Omaha, Nebr.	5.30	10.20	none	13.00
Minneapolis, Minn.	5.51	9.20*	10.00	11.80
Memphis, Ten.	2.65	10.20	10.60	12.60
Baton Route & New Orleans, La.	4.45	13.40	13.60	15.80
Houston, Tex.	6.04	13.60	14.80	15.80

* Tinplate only.

Industrial Briefs . . .

• MOVES—The Standard Products Co. has announced the new location of its general sales offices at 316 Fisher Bldg., Detroit, and its executive and general accounting offices at 2130 W. 110th St., Cleveland.

• ENLARGES SERVICE—An intensive program by Reynolds Metals Co., Louisville, to develop new uses for aluminum in industrial machinery is now under way.

• MORE LAMPS—The $2,500,000 plant now under construction by General Electric Co., Circleville, Ohio, is expected to be completed this year, according to a recent announcement. The new plant will be devoted to the manufacture of the long slimline fluorescent lamps.

• NAMES OFFICIAL—Edgar A. Jett, II, has been named assistant director of Armour Research Foundation of Illinois Institute of Technology. Mr. Jett joined the foundation staff in September 1947 as director of sponsor relations.

• BUILDS KILNS — Electric Metallurgical Co., Ashtabula, Ohio, has announced plans to build three lime kilns, including screening and storage facilities at the company's Lake Road plant. Work on the concrete foundations for the kilns is now under way by the Stevens Construction Co., Cleveland.

• FURNACE AGENT — The Energy Engineering Co., 5252 N. Broadway, Chicago, has been appointed representative in Chicago and adjoining territories for industrial furnaces made by R-S Products Corp., Phila., Pa.

• TAKES OVER—The Whiting Corp., Harvey, Ill., has announced that it has taken over the business and plant of Spencer & Morris, Inc., Los Angeles, and will continue the manufacture of the tramrail-type materials-handling systems.

• TIN SMELTER—The only privately-owned tin smelting plant in the United States is to be erected by the Vulcan Detinning Co., Sewaren, N. J. Wigton-Abbott Corp., Plainfield, N. J., engineer and contractor, has been awarded the contract for its design and construction.

• PLATING RACKS — J. F. Reed, Jr., has announced the opening of a new company to be known as the J. F. Reed Mfg. Corp., at 286 Hamilton St., New Haven, Conn., which will specialize in the design and manufacture of plating and heat treating racks and accessories.

• SELLS TOOL PLANT — Buck Bros., Millbury, Mass., light edge tools, has been sold by Harold B. Proctor to a new concern, Buck Bros., Inc., headed by A. Dudley Bach, president and general manager of New England Metallurgical Corp., and president of Greenman Steel Treating Co., Boston.

• BIRTHDAY—As Mackintosh-Hemphill Co., Pittsburgh and Midland iron and steel roll producers, approached their 145th birthday, the company paid special tribute to 29 employees with service records of from 25 to 50 years.

• DISTRIBUTOR — Welding Supply Center of Buffalo has been appointed exclusive distributor for Agile welding electrodes in western New York.

• NEW FACILITIES — Sundfelt Equipment Co., Inc., has announced that they have moved to a new location at 220 Hudson St., Seattle.

• ELECTS OFFICER—Jack S. Rutherford, president of the Purchasing Agents Assn. of Buffalo and buying agent for the American Magnesium Corp., Buffalo, has been elected a vice-president of the National Assn. of Purchasing Agents.

Canadian Consumers Showing Uneasiness Over Steel Supplies

• • • **Canadian steel consumers** are showing considerable uneasiness regarding their raw material supply for the closing months of this year. Apparently they are not worried about supplies from domestic sources, but are afraid that the United States will reduce sharply its shipments to Canada for last quarter, and imports from across the line make up about one-third of the tonnage used in this country.

So far the cut in U.S. output of steel due to the coal strike has not affected Canadian imports, but some manufacturers are operating on a day-to-day basis and have no assurance of future deliveries. Consumers point out that they are unable to get a firm promise regarding steel deliveries for third quarter from American producers.

Many are of the opinion that the United States defense program may swing a large tonnage of steel away from Canada, and the loss through recent strikes will further affect American exports to Canada, while the Marshall Plan is still another thorn in the side of consumers in this country that depend on American steel supply.

Canadian steel mills are operating at virtual capacity, but there is no prospect of a further increase in domestic output until such time as new production equipment can be installed and placed in operation—estimated at from 1 to 3 years.

One of the bright spots, insofar as Canadian consumers are concerned, is the fact that some of the big automobile plants in the States have been shut down for considerable periods, and this tended to keep a good flow of steel coming into Canada.

A representative of a leading foundry company with plants in Toronto and Montreal stated his firm not only cannot get any assurance on deliveries from American suppliers, but can't get coke for melting purposes.

Makers of electrical goods of all types point out that they are unable to get supplies of steel and some production programs have had to be shelved, and others reduced. Taken as a whole the steel situation for the last half of 1948 is far from bright and most users of American steel can obtain no assurance that supplies will be available later.

J & L Brings Actions To Protect Its Name And Fight Inflation

Pittsburgh

• • • **The suits filed** last week in Detroit and Chicago by Jones & Laughlin Steel Corp. against two alleged gray market steel operators may be only the beginning. A J&L spokesman told THE IRON AGE that "we intend to keep the heat on such deals." From Detroit it is learned that other manufacturers have been offered ingots on the same basis but the source of the offers is not disclosed.

In Pittsburgh a J&L official indicated that the matter of protecting the company's name was just one reason for the suits. It was indicated that a broad attack on the whole steel gray market would, if successful, be a blow at inflation. It is realized in the steel industry that the price cuts made so far may not have the desired effect if many steel consumers are still forced to buy large tonnages at fantastic prices.

Specifically, J&L charges Harry C. Edwards and Howard Kimble with offering to sell 7500 tons of J&L ingots per month for a period of a year to Ford Motor Co. at a price of $75 a ton. Published mill price at the time was $36 a net ton. Mr. Edwards was said to have been doing business as Edwards Industrial Engineering, 723 Fisher Bldg., Detroit. The address of Howard Kimble, allegedly an associate of Mr. Edwards, was given as 205 Wacker Drive, Chicago.

The defendants, according to a sworn affidavit of Herbert Johnson, assistant to J&L's vice-president in charge of sales, are charged with claiming to have control of 15,000 tons a month of J&L ingots. The steel company states that it neither sells ingots or knows the defendants.

J&L says that Laurence B. Trefry, steel buyer for Ford for the last 35 years, was principally responsible for securing the information against the alleged gray marketeers. Mr. Johnson did the bird dog work for the steel company. He was allegedly introduced at the meeting of the Ford buyer and Kimble and Edwards at the latter's Detroit office with no reference to his business connection. From his report of the conversation that took place there he might have been thought a Ford lawyer.

Armco Steel Joins Anti-Inflation Fight

Middletown, Ohio

• • • **Armco Steel Corp.** announced price reductions, effective May 12, to be made on the following grades:

Cold rolled sheets $1 per ton, cold rolled strip $1 per ton, ingot iron cold rolled sheets $1 per ton, ingot iron cold rolled strip $1 per ton, enameling sheets $2 per ton, ingot iron galvanized $3 per ton and ingot iron galvanized paintgrip $3 per ton.

W. W. Sebald, Armco president, in making the announcement said that, "In view of the constantly narrowing margin between costs and selling prices of our products, the prices of sheet steel products actually should be increased rather than decreased. . . . According to government figures, wholesale commodity prices generally have increased 110 pct since 1939. During the same period, average selling prices of our commodity sheet products have increased only about 50 pct, in spite of increases of 87 pct in wages, 255 pct in fuel oil, 158 pct in scrap iron, and similar advances in raw materials, supplies and all the other things we buy.

"At the same time, we believe it is only fair to state that we cannot possibly hold these new, lower prices if our cost trend continues as sharply upward as is the case today. We are determined to do everything within our power to hold the line, but this is a movement which deserves and requires the fullest cooperation of all groups," Mr. Sebald declared.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

10,250 Tons, Kingham, Ariz., transmission towers for U. S. Bureau of Reclamation specification 2165, American Bridge Co., Pittsburgh, low bidder.

2190 Tons, Kingham, Ariz., U. S. Bureau of Reclamation specification 2115, transmission towers to Bethlehem Steel Co., Bethlehem.

2150 Tons, Noblesville, Ind., power station for Public Service Co. of Indiana, to American Bridge Co., Pittsburgh.

900 Tons, Enders, Neb., 50 x 50 ft gates, U. S. Bureau of Reclamation specification 2137, to American Bridge Co., Pittsburgh.

685 Tons, Odair, Wash., bus structure, U. S. Bureau of Reclamation specification 2195, to Bethlehem Steel Co., Bethlehem.

465 Tons, Yonkers, N. Y., addition to Yonkers Telephone Co., building, to Grand Iron Works,, Inc., New York.

180 Tons, Denver, Col., radial gates for Davis Dam, Bureau of Reclamation, Denver, Spec. 2118, to Virginia Bridge Co., Roanoke, Va.

130 Tons, Kingham, Ariz., radial gates U. S. Bureau of Reclamation specification 2118, to Virginia Bridge Co., Roanoke, Va.

115 Tons, Wild Spur, Col., power plant, U. S. Bureau of Reclamation specification 2162, to Virginia Bridge Co., Roanoke, Va.

• • • **Fabricated steel inquiries** this week included the following:

4045 Tons, Portland, Ore., navigation lock and other structures on a section of McNary Dam, Portland District Corps of Engineers, Inv. Eng-35-026-48-800, bids to be opened about June 22.

905 Tons, Herndon, Calif., bridge at San Joaquin River, California Div. of Highways, Sacramento, bids to May 26.

290 Tons, Jimtown, Calif., bridge across Russian River, California Div. of Highways, Sacramento, bids to June 9.

165 Tons, Stanislaus County, Calif., bridge across San Joaquin River, near Crows Landing, California Div. of Highways, Sacramento, bids to June 9.

115 Tons, Cowlitz County, Wash., bridge on Tower Road over Toutle River, Director of Highways, Olympia, bids to May 21.

• • • **Reinforcing bar awards** this week included the following:

1165 Tons, Sacramento, Calif., Bureau of Reclamation, Sacramento, Inv. No. B-321, deformed bars, to Bethlehem Pacific Coast Steel Corp., San Francisco.

705 Tons, Los Angeles, reinforcing steel for Joint Outfall A, Harbor City, Los Angeles County, Sanitation District, to Jos. T. Ryerson & Son, Chicago.

380 Tons, Stickney, Ill., West-Southwest sewage treatment works through Kinney McHugh Co., to Jos. T. Ryerson & Son, Chicago.

250 Tons, Indianapolis, manufacturing building for the American Foundry Co. to Bethlehem Steel Co., Bethlehem.

100 Tons, Gary, Ind., Edison high school building through J. J. Duffy Co., to Carnegie-Illinois Steel Corp., Pittsburgh.

• • • **Reinforcing bar inquiries** this week included the following:

8250 Tons, Portland, Ore., navigation lock and other structures on a section of McNary Dam, Portland District Corps of Engineers, Inv. Eng-35-026-48-800, bids to be opened about June 22.

1051 Tons, Stratford, Wash., lining and structures, main canal, Long Lake Dam, Chief Engineer, Denver, Col., bid call to be issued about May 24, to be opened at a later date.

440 Tons, San Diego County, Calif., bridges and miscellaneous structures between Miramar and Lake Hodges, California Div. of Highways, Los Angeles, bids to June 3.

295 Tons, Tucumcari, N. M., structures, Conchas Canal, Bureau of Reclamation, Tucumcari, Spec. 2217, bids to May 28.

250 Tons, Chicago, building for the Goodman Mfg. Co.

240 Tons, Jimtown, Calif., bridge across Russian River, California Div. of Highways, Sacramento, bids to June 9.

200 Tons, Gary, Ind., additions to two high school buildings.

125 Tons, Herndon, Calif., bridge at San Joaquin River, California Div. of Highways, Sacramento, bids to May 26.

• • • **Railroad car awards** this week included the following:

Greenville Steel Car Co., Greenville, Pa., has been awarded a contract to build 100 70-ton covered hopper cars for Norfolk & Western Ry. Co.

Republic Officials Anticipate Dangers In Court Decision

Flamington, N. J.

• • • **"Having the welfare** of our employees and stockholders at heart at all times, we must proceed cautiously with price reduction which might result in making it impossible to maintain Republic as a safe investment or which might endanger the employment security of our 70,000 employees," declared T. M. Girdler, chairman of the board, and C. M. White, president, in a joint statement before the annual stockholders' meeting of Republic Steel Corp.

The officers also commended "the action of the officers of the unions and of our employees in strictly adhering to the 'no strike' pledge . . . when the company recently declined to grant further wage increases." . . . "With . . . profit of less than 5¢ out of each sales dollar . . . it is only our full capacity production which enables Republic to make a fair profit in the face of present high costs," the statement said.

In referring to the effect of the recent Supreme Court decision (Cement Case) on the basing point system, the officers asserted, "If steel companies should be prohibited from selling on the delivered price basis . . . each steel company will seek to build up its markets in the area adjacent to its plant in which it has the freight advantage. . . . The tendency will be for users of steel to move close to steel producing centers to gain the advantage of a low freight rate and to have available a sure source of supply."

The officials said that in certain lines capacity business is apparent for several years to come. They pointed out that demand for alloy and stainless steels has increased greatly over 1947.

USAF Impact

• • • For important machine tool developments see special report by Bill Lloyd, Cleveland IRON AGE editor on Air Force requirements, p. 126 this issue.—Ed.

AMERICAN IRON AND STEEL INSTITUTE
SHIPMENTS OF STEEL PRODUCTS
ALL GRADES INCLUDING ALLOY AND STAINLESS
(Net Tons)

MARCH - 1948
Month

Steel Products	Number of companies	Items	Current Month			To Date This Year			Whole Year 1947		
			Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)	Net Shipments (Excluding Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale) (Net Tons)	Per cent of Total Shipments	Shipments to Members of the Industry for Conversion into Further Finished Products or For Resale (Net Tons)
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	43	1	324,129	5.4	242,395	904,157	5.5	732,893	* 2,966,748	* 4.7	*2,396,343
Structural shapes (heavy)	12	2	382,436	6.4	2,454	1,040,634	6.3	8,213	4,436,129	7.0	2,640
Steel piling	4	3	31,719	0.5	-	78,273	0.5	8	324,224	0.5	23
Plates (sheared and universal)	29	4	630,339	10.5	40,537	1,697,031	10.3	104,171	6,345,216	*10.1	219,227
Skelp	6	5	16,870	0.3	44,129	40,879	0.3	119,887	160,989	0.3	384,004
Rails—Standard (over 60 lbs.)	4	6	186,381	3.1	740	510,715	3.1	3,253	2,207,146	3.5	991
—All other	5	7	19,689	0.3	37	68,153	0.4	404	211,900	0.3	329
Joint bars	7	8	14,658	0.3	3,665	36,571	0.2	9,229	173,925	0.3	15,198
Tie plates	7	9	48,671	0.8	8	126,031	0.8	179	504,779	0.8	4,437
Track spikes	8	10	13,937	0.2	66	35,672	0.2	90	163,746	0.3	146
Hot Rolled Bars—Carbon	34	11	560,106	9.4	55,780	*1,599,633	9.7	162,705	6,242,416	9.9	745,770
—Reinforcing—New billet	16	12	123,133	2.1	645	335,697	2.0	1,914	1,277,075	2.0	9,775
—Rerolled	13	13	14,903	0.2	-	* 40,640	0.3	-	175,833	0.3	-
—Alloy	27	14	172,747	2.9	26,012	* 476,878	2.9	56,643	1,741,432	* 2.8	212,382
—TOTAL	44	15	870,889	14.6	82,437	*2,452,848	14.9	221,262	9,436,756	*15.0	967,927
Cold Finished Bars—Carbon	27	16	125,175	2.1	222	351,563	2.1	973	1,426,701	2.3	9,249
—Alloy	26	17	18,910	0.3	668	50,844	0.3	1,253	218,802	0.3	2,601
—TOTAL	35	18	144,085	2.4	890	402,407	2.4	2,226	1,645,503	2.6	11,850
Tool steel bars	18	19	7,000	0.1	132	19,921	0.1	306	87,279	0.1	1,670
Pipe & Tubes—Butt weld	15	20	176,202	3.0	3,265	* 491,435	3.0	7,109	1,892,691	3.0	78,080
—Lap weld	8	21	32,925	0.6	-	93,752	0.6	-	389,762	0.6	875
—Electric weld	13	22	138,452	2.3	562	382,007	2.3	1,234	1,254,325	2.0	4,274
—Seamless	16	23	265,003	4.4	17,763	703,682	4.3	44,849	2,581,106	4.1	157,208
Wire rods	19	24	58,878	1.0	28,587	171,496	1.0	78,425	667,282	1.1	321,192
Wire—Drawn	39	25	242,449	4.1	15,970	684,760	4.2	46,143	2,590,963	4.1	181,785
—Nails and staples	17	26	78,858	1.3	1,048	216,587	1.3	3,699	799,436	1.3	8,481
—Barbed and twisted	14	27	23,032	0.4	-	68,251	0.4	28	256,991	0.4	128
—Woven wire fence	12	28	34,940	0.6	305	100,656	0.6	752	407,295	0.6	3,616
—Bale ties	11	29	10,673	0.2	-	30,497	0.2	-	119,917	0.2	-
Black Plate—Ordinary	9	30	72,332	1.2	50	196,211	1.2	562	801,745	1.3	2,033
—Chemically treated	1	31	1,147	-	-	2,312	-	-	19,252	-	-
Tin and Terne Plate—Hot dipped	8	32	221,470	3.7	-	487,552	3.0	72	2,093,149	3.3	228
—Electrolytic	9	33	171,241	2.9	-	419,909	2.6	215	1,617,659	2.6	529
Sheets—Hot rolled	32	34	693,306	11.6	57,251	*1,957,563	11.9	169,866	7,891,798	12.5	578,426
—Cold rolled	16	35	572,927	9.6	698	1,635,143	10.0	5,158	5,504,278	8.7	28,498
—Galvanized	16	36	144,069	2.4	190	400,582	2.4	727	1,609,881	2.5	889
Strip—Hot rolled	22	37	141,155	2.4	29,193	423,213	2.6	86,687	1,740,085	2.7	308,655
—Cold rolled	33	38	158,220	2.6	2,234	431,730	2.6	5,994	1,613,002	2.6	28,030
Wheels (car, rolled steel)	5	39	31,131	0.5	108	79,675	0.5	324	356,873	0.6	2
Axles	5	40	19,338	0.3	6	47,671	0.3	74	185,019	0.3	53
All other	-	41	-	-	-	-	-	-	-	-	-
TOTAL STEEL PRODUCTS	140	42	5,978,551	100.0	574,720	*16,437,976	100.0	1,654,039	*63,057,150	100.0	*5,717,765

During 1947 the companies included above represented 99.5% of the total output of finished rolled steel products as reported to the American Iron and Steel Institute.

* Adjusted.

FTC Attorney Readies Cease & Desist Order On Basing Point Case

Washington

• • • **With the main body** of evidence in the steel case expected to be in the hands of the Federal Trade Commission by mid-June, Lynn C. Paulson, chief attorney in the complaint against the steel industry, is beginning to lay the groundwork for the type of cease-and-desist order he will present to the full Commission for approval prior to being issue.

Mr. Paulson told THE IRON AGE this week that he is presently inclined to write an order which would call on the industry to (1) sell f.o.b. mill when requested, (2) conform to the Supreme Court decisions in the corn products and cement cases, which would call for establishment of a mill price at every producing point and dissolve the basing point system as presently constituted, (3) cease the compilation and dissemination of freight rate information. (THE IRON AGE, Feb. 26, 1948). The order would also cover many other industry practices, but these cover FTC's major charges against the industry.

See pp. 121, 123, 124 The Iron Age, May 6, 1948 for basing point discussion. —Ed.

Meanwhile, hearings in the case are scheduled to reopen on May 24 for a 2-week period.

AMERICAN IRON AND STEEL INSTITUTE

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

YEAR 1948

(Preliminary)

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated weekly production (Net tons)	Number of weeks in month
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,768,497	95.5	343,169	77.5	361,110	79.0	7,472,776	93.6	1,686,857	4.43
* February	6,245,338	94.3	340,596	82.3	354,270	82.9	6,940,204	93.0	1,676,378	4.14
* March	6,841,578	96.6	363,235	82.0	403,322	88.2	7,608,135	95.3	1,717,412	4.43
* *1st Quarter*	*19,855,413*	*95.5*	*1,047,000*	*80.6*	*1,118,702*	*83.4*	*22,021,115*	*94.0*	*1,693,932*	*13.00*
† April	5,654,125	82.4	185,089	43.2	390,548	88.2	6,229,762	80.6	1,452,159	4.29
May										4.43
June										4.29

YEAR 1947

Period	OPEN HEARTH		BESSEMER		ELECTRIC		TOTAL		Calculated weekly production (Net tons)	Number of weeks in month
	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity	Net tons	Percent of capacity		
January	6,544,841	95.1	384,096	87.7	284,309	65.9	7,213,246	93.0	1,628,272	4.43
February	5,830,371	93.8	314,912	79.6	276,779	71.1	6,422,062	91.7	1,605,515	4.00
March	6,614,369	96.1	378,893	86.5	314,224	72.9	7,307,486	94.3	1,649,545	4.43
1st Quarter	*18,989,581*	*95.0*	*1,077,901*	*84.8*	*875,312*	*69.9*	*20,942,794*	*93.1*	*1,628,522*	*12.86*
April	6,360,600	95.4	375,675	88.6	306,422	73.4	7,042,697	93.8	1,641,654	4.29
May	6,634,716	96.4	372,878	85.2	321,903	74.6	7,329,497	94.5	1,654,514	4.43
June	6,312,674	94.7	351,247	82.8	304,744	73.0	6,968,665	92.8	1,624,397	4.29
2nd Quarter	*19,307,990*	*95.5*	*1,099,800*	*85.5*	*933,069*	*73.7*	*21,340,859*	*93.7*	*1,640,343*	*13.01*
1st 6 Months	*38,297,571*	*95.3*	*2,177,701*	*85.2*	*1,808,381*	*71.8*	*42,283,653*	*93.4*	*1,634,467*	*25.87*
July	6,028,707	87.8	256,125	58.6	285,322	66.3	6,570,154	84.9	1,486,460	4.42
August	6,324,456	91.9	346,033	79.0	311,597	72.2	6,982,086	90.1	1,576,092	4.43
September	6,147,448	92.4	334,425	79.0	306,769	73.6	6,788,642	90.6	1,586,131	4.28
3rd Quarter	*18,500,611*	*90.7*	*936,583*	*72.2*	*903,688*	*70.7*	*20,340,882*	*88.5*	*1,549,191*	*13.13*
9 Months	*56,798,182*	*93.7*	*3,114,284*	*80.8*	*2,712,069*	*71.4*	*62,624,535*	*91.8*	*1,605,757*	*39.00*
October	6,826,543	99.2	384,272	87.8	349,520	81.0	7,560,335	97.5	1,706,622	4.43
November	6,538,179	98.1	360,620	85.0	334,236	80.0	7,233,035	96.3	1,686,022	4.29
December	6,649,666	96.8	373,367	85.5	343,043	79.7	7,366,076	95.2	1,666,533	4.42
4th Quarter	*20,014,388*	*98.0*	*1,118,259*	*86.1*	*1,026,799*	*80.3*	*22,159,446*	*96.4*	*1,686,411*	*13.14*
2nd 6 months	*38,514,999*	*94.4*	*2,054,842*	*79.1*	*1,930,487*	*75.5*	*42,500,328*	*92.5*	*1,617,827*	*26.27*
Total	76,812,570	94.8	4,232,543	82.1	3,738,868	73.7	84,783,981	92.9	1,626,083	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,553,721 net tons open hearth, 98,849 net tons Bessemer and 97,358 net tons electric ingots and steel for castings, total 1,749,928 net tons; based on annual capacities as of January 1, 1947 as follows: Open hearth 81,010,990 net tons, Bessemer 5,154,000 net tons, Electric 5,076,240 net tons, total 91,241,230 net tons.

* Revised.
† Preliminary figures, subject to revision.

MACHINE TOOLS

. . . News and Market Activities

Army Gives Builders 5-Year Plan of Machine Tool Requirements

• • • **Broad plans,** including a possible requirement for more than 265,000 machine tools over the next 5 years, were laid before about 50 machine tool builders, representing a cross-section of the industry, by Army Air Force officers at a symposium called by the Air Materiel Command last week at Dayton.

The symposium was held at Wright-Patterson Air Force Base, headquarters of the Air Materiel Command, to clarify the needs of the USAF on tools to make materiel for the Air Force.

Orders for these machines will be placed by prime contractors, many of whom must double their output, but the Air Forces will own the machines, it is understood.

In mathematical terms, this requirement will more than double the machine tool industry's output, on the basis of 1947 shipments of $300 million for the next 5 years. It will mean 50,000 tools a year, or 1000 tools a week, thus creating a comfortable volume of business for the machine tool industry for the next 5 years from what amounts to a single source.

In addition, it is understood that the Ordnance Dept. has tentative plans calling for $100,000 of machine tools. Naval Air Force, Bureau of Ships, and AAF requirements are covered in the 265,000 machines.

It is understood that the bulk of this tooling will be for reciprocating engine production.

Opening remarks at the symposium were addressed to the group by Lt. Gen. Benjamin W. Chidlaw, Deputy Commanding General, Air Materiel Command; Maj. Gen. Kenneth B. Wolfe, Director of Procurement and Industrial Planning, and Brig. Gen. F. M. Hopkins, Chief, Industrial Planning Div.

Representatives of AMC Procurement and Industrial Planning Div. addressed the group and explained to them their vital part in helping to keep the Air Force in top position in the world of today. Without their complete cooperation, they were told, it would be virtually impossible to keep aircraft production at a point where the manufacturers could fill Air Force orders rapidly.

Broad Plans Outlined Before Symposium Called by Air Arm Materiel Command

o o o

In addition to discussing the general overall picture in regard to machine tools, Lt. Col. Mohler, Deputy Chief, Industrial Mobilization Div., told the manufacturers exactly what would be required of them if the need arose.

"Industry," he said, "has contributed wholeheartedly and we have gone to industry to crystallize our planning and thinking."

A number of machine tool builders from Cleveland attended the affair, including T. H. Doan, president, Foote-Burt Co.; George A. Yost, president, Lucas Machine Tool Co.; Tell Berna, general manager, National Machine Tool Builders' Assn.; Charles J. Stilwell, president, Warner & Swasey Co.; Lloyd D. McDonald, vice-president, Warner & Swasey Co., and John A. Bradner, president, Lees-Bradner Co.

Manufacturers of machines particularly adapted to the production of jet engine parts were asked for possible suggestions as to tooling, machining methods, etc., and the entire group was shown one of the new jet fighters.

While no orders were placed at the symposium, indications are that business will soon be forthcoming, and some producers are already including possible demands upon manufacturing facilities in tentative schedules.

Some observers believe that the program may even require allocations of materials, controls, certain manpower regulations, principally draft deferments for strategic personnel, etc., etc.

In Detroit there is moderate activity in machine tools for product improvement, although no new major tooling programs were reported this week. Some orders for the Reo program were placed recently, it is indicated, and inquiries were reported from a number of sources, including Chevrolet-Flint, Detroit Transmission, and Chevrolet Gear & Axle.

Informed sources here believe the interest of small tool and die shops in new tooling has been spurred on by war talk and the possible threat of allocations. Some segments of the industry indicate that numerically the majority of their new equipment is going to small shops, although the dollar volume of sales is still in favor of the large producers with huge plants that require new equipment for product improvement.

A renewal of interest in the proposed Ford research laboratory is reported this week, although no official tooling program has been proposed, according to reports.

Several local sources have been asked to quote on latest type equipment that would presumably be used for aircraft production in the event of hostilities.

Foundrymen Believe Handbook Needed on Gray Iron Products

Cleveland

• • • **Most foundrymen** are of the opinion that engineers and designers are not fully aware of the engineering properties and characteristics which various types of gray irons have to offer to industry, according to a recent survey conducted by Gray Iron Founders' Society.

With many foundries now regularly casting up to 50,000 psi and 60,000 psi tensile irons, with transverse strengths of 3600 lb to 4000 lb, foundrymen feel the need of an authoritative handbook on gray iron products which will enable engineers and designers to obtain up-to-date information on the industry's products, according to Gray Iron Founders' Society, which plans to prepare such a handbook in the near future.

SCRAP

Shipments Remain Good; Prices Steady

New York

• • • **Shipments of scrap** are generally holding up well and the market firmness and price stability which have held over the past 7 weeks continue.

In the Cleveland area the freight rate increase situation was clarified as mills put their new orders on the following basis: For scrap from outside a basing point, the new freight rate is deducted from the price at the most favorable basing point and added on again at destination; and on orders originating within basing points, mills absorb the freight.

The action of the Canadian government in asking Dominion dealers to stop taking material from the Buffalo district has Buffalo scrap dealers a little hot under the collar since the "request" apparently hasnt been applied to Detroit, Duluth and other sections where dealers are taking a little extra profit selling to north of the border brokers. As soon as consumers squawk about shortages in these other districts, however, it is expected that the lid will be clamped on all American material.

Claims that scrap quality is at an all time low have been heard with increasing frequency over the past month—with such frequency, in fact, that there can be little doubt as to the correctness of the report. Some of the mills with comparatively comfortable inventories are rigorously inspecting and rejecting material in an effort to reestablish standards.

Among the few price changes, advances in low phos items in both Pittsburgh and Chicago and a very slight increase in railroad specialties in Pittsburgh were the most noteworthy developments.

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PITTSBURGH — Pricewise, market sources are a trifle confused. On the bearish side is weakness in the metal market, which sometimes transmits itself sympathetically to iron and steel scrap. Fabricators' scrap steel shipments are beginning to show the effects of ingot losses earlier in the year, with some reduction in their offerings. However, shipments generally are reported good. Looking ahead is the prospect of vacation shutdowns in some smaller plants and foundries and the possibility of the miners extending their midyear vacation in the absence of a contract. On the bullish side are the 25¢ increase in railroad specialties based on the latest list and a 50¢ advance in low phos to a quotation of $47.50 to $48. Conversion ingot demand is reported tighter.

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CHICAGO—Carnegie-Illinois bought a substantial tonnage last week at formula price. Some brokers still claim they can't buy for $39. Those who took Carnegie's orders report they were plainly told that if they pay more than formula prices to cover the mill's purchases, their contract will be cancelled. Considerable scrap is moving from Milwaukee to Detroit and Canada via boat. The Canadian price is equivalent to $41 a gross ton Chicago. This movement is hurting scrap deliveries to some mills here. Foundries with briquetting machines are taking practically all the tonnages of cast iron borings. Industrial scrap supplies in some dealers' yards are at an all time low. Mill inventories are comparatively high.

•

PHILADELPHIA—Mills are reported to be holding scrap purchases to formula prices in the local market even though some brokers are required to pay the same prices for scrap. On delivered-to-consumer purchases the mills are paying the freight increase on old contracts, but on new orders they are forcing the absorption of the increase by dealers and brokers. Out-of-district purchases are being made on an f.o.b. basis with the mills paying for the freight increases. Fair shipments of scrap are reported but mills would like to obtain larger tonnages. The only heavy melting grade which is plentiful is No. 2 bundles. The top of the range reflects purchases from out-of-district markets which have grown to large proportions.

•

CLEVELAND—Mills began placing orders on a new basis this week. On orders since May 6, when the new freight rate went into effect, for material originating outside a basing point, the new freight rate is deducted from the price at the most favorable basing point and added on again at destination. On orders for material originating within basing points, mills absorb the freight. FOB shipping point prices remain the same. Net general effect of this absoroption on a $3 freight, for example, is a 16¢ increase in cost to the consumer. Mills here and in the Valley have enough material on the ground to be classed as comfortable and rejections are increasing. Brokers claim the quality of the available material is at an all time low and some consumers would rather pay the premium for good scrap. Cast is a little weak at the moment with some of the foundries working on reduced schedules as a result of coke and pig iron shortages.

DETROIT—The local scrap market which has been kept off balance for the past several weeks by persistent reports of sales of quantities of scrap at over-the-formula levels has been given a hypodermic by the Chrysler strike which has already made substantial cuts in the volume of scrap generated in Chrysler plants and its suppliers. Dealers are reported to be holding firmly to their available scrap, presumably feeling that prices will stiffen as the strike continues. No price changes for any grades are as yet evident, however, and the amount of scrap moving on new contracts is reported to be small.

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BUFFALO—Buying of No. 2 steel by a local consumer at $42 raised hopes of some sellers for a general lifting of prices, but the big mills held to the formula. The latter made one concession, as expected, by absorbing the freight increase, but without changing list prices. Feeling ran high among dealers over the halting of local scrap shipments to Canada, and many were asking why Buffalo was singled out while shipments were permitted to continue from Detroit, Duluth and other border points. Buyer of the No. 2 steel did not want bundles, and therefore created the unusual price variation.

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NEW YORK—The market has dulled somewhat, with poor weather not helping things any. Scrap is moving fairly well still, but not up to the volume of a few weeks ago. Prices remain firm and unchanged.

•

CINCINNATI—Prices are holding firm in a slow market. Rails are softer, as most of the foundries are pretty well loaded at the moment. Cast is still holding, however, and with the exception of a few items that have flooded the market here within the last 10 days, there is little promise of price softness. Newport is holding up shipments temporarily, and movement of openhearth material to most consumers has been heavy enough to bring about some rejections.

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BIRMINGHAM—An active scrap market in this area shows little change. Demand is steady for all grades and prices are firm. Most of the scrap produced locally is being consumed locally, but openhearth material is reported moving to northern mills from Florida, south Louisiana and south Georgia.

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ST. LOUIS—The movement of scrap iron to the St. Louis market was heavy over the last week due largely to the arrival of cars that had been accepted for shipment before the freight rate increase. Prices are unchanged.

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BOSTON—There is no change in the scrap situation here. With very little exception, brokers say the demand is good and they are trying to buy on the basis of formula prices. A couple of brokers reported business as spotty. Foundry grades are quiet at the moment.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
RR. hvy. melting	41.00 to 41.50
No. 2 hvy. melting	40.00 to 40.50
RR. scrap rails	55.50 to 56.50
Rails 2 ft and under	62.50 to 63.50
No. 1 comp'd bundles	40.00 to 40.50
Hand bdld. new shts.	40.00 to 40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn.	41.50 to 42.00
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	38.00 to 38.50
Mixed bor. and turn.	35.50 to 36.00
Cast iron boring	38.00 to 38.50
No. 1 cupola cast.	63.00 to 65.00
Hvy. breakable cast.	52.50 to 53.50
Malleable	77.00 to 79.00
RR. knuck. and coup.	54.75 to 55.75
RR. coil springs	54.50 to 55.50
RR. leaf springs	54.50 to 55.50
Rolled steel wheels	54.50 to 55.50
Low phos.	47.50 to 48.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $39.50
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	39.00 to 39.50
No. 2 dealers' bundles	39.00 to 39.50
Bundled mach. shop turn.	37.00 to 37.50
Galv. bundles	35.00 to 35.50
Mach. shop turn.	34.00 to 34.50
Short shov. turn.	35.50 to 36.50
Cast iron borings	38.00 to 39.00
Mix. borings & turn.	34.00 to 34.50
Low phos. hvy. forge	48.00 to 50.00
Low phos. plates	45.00 to 46.00
No. 1 RR. hvy. melt.	41.25 to 41.75
Rerolling rails	53.00 to 54.00
Miscellaneous rails	51.00 to 52.00
Angles & splice bars	52.00 to 53.00
Locomotive tires, cut.	54.00 to 55.00
Cut bolster & side frames	49.00 to 51.00
Standard stl. car axles	58.00 to 59.00
No. 3 steel wheels	51.00 to 52.00
Couplers & knuckles	54.00 to 55.00
Rails, 2 ft and under	56.00 to 57.00
Malleable	76.00 to 78.00
No. 1 mach. cast	72.00 to 75.00
No. 1 agricul. cast.	61.00 to 65.00
Heavy breakable cast.	51.00 to 52.00
RR. grate bars	59.00 to 61.00
Cast iron brake shoes	58.00 to 60.00
Cast iron carwheels	58.00 to 60.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.50
No. 2 hvy. melting	38.50 to 39.50
No. 1 bundles	38.50 to 39.50
No. 2 bundles	38.50 to 39.50
Mach. shop turn.	33.00 to 33.50
Shoveling turn.	35.00 to 35.50
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos., plate	46.00 to 48.00
No. 1 cupola cast	63.00 to 64.00
Hvy. breakable cast	53.00 to 54.00
Rails 18 in. & under	60.00 to 61.00
Rails random length	51.00 to 52.00
Drop broken	66.00 to 68.00

BOSTON

Dealers' buying prices, per gross ton, f.o.b. Boston

No. 1 hvy. melting	$31.65 to $31.90
No. 2 hvy. melting	31.65 to 31.90
Nos. 1 and 2 bundles	31.65 to 31.90
Busheling	31.65 to 31.90
Shoveling turn.	.... 28.90
Machine shop trun.	.... 26.90
Mixed bor & turn.	.... 26.90
Cl'n cast chem. bor.	38.00 to 39.00
No. 1 machinery cast.	56.00 to 60.00
No. 2 machinery cast.	55.00 to 56.00
Heavy breakable cast.	50.00 to 52.00
Stove plate	52.00 to 53.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	.... $35.50
No. 2 hvy. melting	.... 35.50
No. 1 bundles	.... 35.50
New busheling	.... 35.50
Flashings	.... 35.50
Mach. shop turn.	$29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	28.50 to 29.00
Low phos. plate	39.50 to 40.50
No. 1 cupola cast.	55.00 to 57.00
Heavy breakable cast.	48.00 to 52.00
Stove plate	50.00 to 52.00
Automotive cast	55.00 to 57.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	42.00 to 43.00
No. 2 bundles	39.00 to 39.50
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	34.50 to 35.00
Mixed bor. & turn.	34.50 to 35.00
Clean cast chemical bor.	42.00 to 44.00
No. 1 machinery cast.	66.00 to 68.00
No. 1 mixed yard cast.	62.00 to 63.00
Hvy. breakable cast.	63.00 to 64.00
Clean auto cast.	65.00 to 66.00
Hvy. axle forge turn.	44.00 to 45.00
Low phos. plate	47.00 to 48.00
Low phos. punchings	47.00 to 48.00
Low phos. bundles	45.00 to 46.00
RR. steel wheels	52.00 to 53.00
RR. coil springs	52.00 to 53.00
RR. malleable	75.00 to 78.00
Cast iron carwheels	68.00 to 70.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
Bundled sheets	37.50 to 38.50
Mach. shop turn.	33.00 to 33.50
Locomotive tires, uncut.	46.00 to 47.00
Mis. std. sec. rails	46.50 to 47.50
Steel angle bars	49.00 to 50.00
Rails 3 ft and under	52.00 to 53.00
RR. steel springs	48.50 to 49.50
Steel car axles	48.50 to 49.50
Grate bars	60.00 to 62.00
Brake shoes	58.00 to 60.00
Malleable	71.00 to 72.00
Cast iron car wheels	61.00 to 62.00
No. 1 machinery cast	65.00 to 67.00
Hvy. breakable cast	58.00 to 59.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy, melting	.... $37.50
No. 2 hvy, melting	.... 37.50
No. 2 bundles	.... 37.50
No. 1 busheling	.... 37.50
Long turnings	$25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	42.50 to 43.50
Structural and plate	42.50 to 43.50
No. 1 cupola cast.	64.00 to 67.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy, melt.	38.50 to 40.00
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 45.00
Rerolling rails	51.00 to 53.00
Angles & splice bars	51.00 to 53.00
Rails 3 ft & under	52.00 to 55.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos.	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	.... $34.50
No. 2 hvy. melting	.... 34.50
No. 2 bundles	.... 34.50
Mach. shop turn.	$29.00 to 29.50
Mixed bor. & turn.	29.00 to 29.50
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	55.00 to 56.00
Clean auto cast.	55.00 to 56.00
Hvy. breakable cast.	54.00 to 55.00
Charging box cast.	54.00 to 55.00
Unstrp. motor blks.	51.00 to 52.00
Cl'n cast chem. bor.	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy, melting	$39.75 to $45.00
No. 2 hvy. melting	39.75 to 42.00
No. 1 bundles	.... 39.75
No. 2 bundles	.... 39.75
No. 1 busheling	.... 39.75
Mach. shop turn.	34.75 to 35.00
Shoveling turn.	35.00 to 36.00
Cast iron borings	.... 35.75
Mixed bor. & turn.	.... 34.75
Mixed cupola cast.	62.00 to 64.00
Charging box cast.	56.00 to 57.00
Stove plate	62.00 to 64.00
Clean auto cast.	62.00 to 64.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 49.00
Low phos. plate	44.75 to 46.00
Scrap rails	50.00 to 52.00
Rails 3 ft & under	57.00 to 58.00
RR steel wheels	51.00 to 52.00
Cast iron carwheels	51.00 to 52.00
RR. coil & leaf spgs.	51.00 to 52.00
RR. knuckles & coup.	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	35.50 to 36.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	35.50 to 36.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	65.00 to 70.00
Malleable	75.00 to 77.00
RR. cast.	70.00 to 73.00
Railroad grate bars	60.00 to 61.00
Stove plate	60.00 to 62.00
RR. hvy. melting	40.00 to 40.00
Rails 3 ft & under	60.00 to 61.00
Rails 18 in. & under	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $35.00
No. 2 hvy. melting	.... 35.00
No. 2 bales	.... 35.00

Per gross ton delivered to consumer:

No. 3 bales	.... $19.00
Mach. shop turn.	.... 16.00
Elec. furn. 1 ft under	$32.00 to 34.00
No. 1 cupola cast.	40.00 to 43.00
RR. hvy. melting	.... 34.00

LOS ANGELES

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $35.00
No. 2 hvy. melting	.... 35.00
No. 1 bales	.... 35.00
No. 2 bales	.... 35.00
No. 3 bales	.... 19.00
Mach. shop turn.	.... 17.00
No. 1 cupola cast.	$40.00 to 43.00
RR. hvy. melting	.... 34.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	.... $26.00
Elec. furn. 1 ft and under	.... 30.00
No. 1 cupola cast.	.... 44.00
RR. hvy. melting	.... 26.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd	21.00*
Bushelings, new fact, unprep'd	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 46.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

NONFERROUS METALS

. . . News and Market Activities

Little Hope Is Seen for Passage of Metal Subsidy Legislation

New York

• • • **Recent contacts** with congressional leaders have convinced some members of the metals industry that there is no possibility of the passage of subsidy legislation in their present forms at this session of Congress. Opposition to pending legislation by congressmen, is supported by the viewpoint of Interior Dept. officials that the measures would place a premium on high cost production of relatively small tonnages at a sacrifice of the larger tonnages of those metals now being produced by lower cost mines.

Recognizing the need for the payment of subsidies during the war under the premium price plan while metals prices were under strict control, many producers believe that there is no longer any need for subsidized production. There is the probability that government payments to high cost producers now would work to the disadvantage of the country's metal consumers.

Lead is at present in the most critical short supply position. At the present high price for lead, producers in the marginal Tri-State district are concentrating their production facilities on the high-lead content ores of the district. The subsidies proposed would encourage them to turn away from these ores and direct their attention to the higher zinc containing ores for a greater net return, which would reduce the overall lead production of the district.

Western lead mines, which are suffering serious shortages of labor, are nevertheless producing at a very high rate. Subsidized production by high cost producers in that area would be sure to draw off some labor from the lower cost producers and result in a net loss in production from the area. In general, there would be a loss of efficiency in mine production, which would tend to operate on a cost-plus basis.

These considerations apply to the Russell bill, withheld by House leadership from action on the floor after being reported out by the Committee on Public Lands and the Rules Committee, and the three new bills introduced into the House 2 weeks ago by Representatives Jensen, Crawford and Mills. The bills are identical, except for very minor variations. They call for an expenditure of $190 million in 1949 and the operation of the subsidy plan until June 30, 1955. They represent merely an extension of the premium price plan at higher payment rates, the resultant output to be earmarked for the strategic stockpile.

There is little possibility of the passage of any of these bills.

Better prospects for the establishment of a subsidy program are seen to lie in the proposed bill drafted by Bureau of Mines officials based on the recommendations of the subcommittee on incentives of the Interior Department's National Minerals Advisory Committee. So far, it has not received any congressional sponsorship.

The proposed bill provides for incentive payments on a contract basis for a maximum period of 3 years for increased production of any of the strategic materials covered by the stockpiling act. The principal difference between this measure and the other subsidy bills lies in the option afforded the National Security Resources Board to direct the administrator, who is to be the Secretary of the Interior, to make incentive contracts for only metals or minerals which it considers most strategically important. Also, the proposed bill would not permit the payment of incentives to high cost mines in labor-short mining areas.

If such legislation were to be passed by Congress, proper administration would require an administrator or his close advisors with the highest degree of skill in mining engineering so as to avoid the pitfalls of overpayment of incentives, according to competent observers. In addition, political pressure on the administrator from miners and their congressmen would be very great.

Opposition Maintains Subsidy Would Place Premium On High Cost Output

By JOHN ANTHONY
Eastern Regional Editor

Aluminum Ingots Rise

New York

• • • **Secondary aluminum** ingot prices jumped up again last week when remelters increased their prices in all grades by 1¢ to 1¾¢ per lb. Active demand by foundries, coupled with diminishing supplies, was responsible for the increases. Ingot makers raised their scrap buying prices by as much as 1½¢ per lb and dealers prices went up correspondingly.

Reductions were made by some producers of red metal ingots, causing a price spread of ¼¢ in certain grades. The custom smelters buying copper scrap at the high end of the range have dropped their buying prices by ½¢. Ingot makers are out of the copper scrap market because refiners are offering ½¢ per lb more. However, they have reduced their buying prices for composition grades by as much as ¾¢. The decline in the copper and brass scrap market indicates a reaction to the heavy buying by some large smelters recently at prices set at the top of the market.

Nonferrous Metals Prices

	May 12	May 13	May 14	May 15	May 17	May 18
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	17.30	17.30	17.30	17.30	17.30	17.30

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, 10,000 lb, f.o.b shipping point, freight allowed.... 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American, Laredo, Tex... 33.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be.....$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....$40.00
Cadmium, del'd $1.75
Cobalt, 97-99% (per lb).....$1.65 to $1.72
Copper electro, Conn. Valley..... 21.50
Copper, lake, Conn. Valley.....21.625
Gold, U. S Treas., dollars per oz...$35.00
Indium, 99.8%, dollars per troy oz... $2.25
Iridium, dollars per troy oz...$105 to $115
Lead, St. Louis 17.30
Lead, New York 17.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex. 20.50
Magnesium, sticks, carlots..... 34.50
Mercury, dollars per 76-lb flask, f.o.b. New York.....$75 to $77
Nickel, electro, f.o.b. New York.... 36.56
Palladium, dollars per troy oz.....$24.00
Platinum, dollars per troy oz...$98 to $101
Silver, New York, cents per oz.....74.625
Tin, Grade A, New York..... 94.00
Zinc, East St. Louis..... 12.00
Zinc, New York 12.65
Zirconium copper, 6 pct Zr, per lb contained Zr. $8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No. 115 ..... 19.00–19.25
No. 120 ..... 18.50–18.75
No. 123 ..... 18.00–18.25
80-10-10 ingot
No. 305 ..... 24.25
No. 315 ..... 21.75
88-10-2 ingot
No. 210 ..... 30.00
No. 215 ..... 28.00
No. 245 ..... 22.25–22.75
Yellow ingot
No. 405 ..... 15.25–16.00
Manganese bronze
No. 421 ..... 18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys
0.30 copper, max. 21.75
0.60 copper, max. 21.50
Piston alloys (No. 122 type)... 20.00
No. 12 alum, (No. 2 grade).... 19.75
108 alloy 20.00
195 alloy 19.75
13 alloy 21.50
AXS-679 ..... 20.00

Steel deoxidizing aluminum, notch-bar granulated or shot
Grade 1—95 pct-95½ pct..... 19.50–20.00
Grade 2—92 pct-95 pct..... 19.00–19.50
Grade 3—90 pct-92 pct..... 18.50–19.00
Grade 4—85 pct-90 pct..... 17.50–18.00

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37⅝
Electrodeposited 32⅝
Rolled, oval, straight, delivered... 33.09
Brass, 80-20, frt. allowed
Cast, oval, 15 in. or longer..... 33⅜
Zinc, cast, 99.99 ..... 20.50
Nickel 99 pct plus, frt. allowed
Cast 51
Rolled, depolarized 52
Silver 999 fine
Rolled, 1000 oz lots per troy oz... 67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 43.00
Copper sulfate, 99.5, crystals, bbls.. 11.50
Nickel salts, single, 425 lb bbls. frt. allowed 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct domestic, 100 lb drums 15.00
Zinc cyanide, 100 lb drums..... 34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed 7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. 0.081 in.: 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. 0.032 in.: 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F,24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.

Extruded Solid Shapes: Shape factors 1 to 4; 31¢ to 59¢; 11 to 13, 31.9¢ to 69c; 23 to 25, 33.4c to 90¢; 35 to 37, 40.8¢ to $1.25; 47 to 49, 58.7¢ to $1.84.

Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ⅛ to ¾ in., 28¢ to 40.5¢; ⅜ to ½ in., 29c to 43c; ⅛ to ⅜ in., 30¢ to 46.5¢; 1/16 to 1/32 in., 32.5¢ to 53.5¢; 9/64 to 1/32 in., 35.5¢ to 62¢.

Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.

Screw Machine Stock: Drawn, 11/16 to ⅛ in., 11S-T3, 34¢ to 45¢; cold-finished, ⅝ to 1½ in., 11S-T3, 33¢ to 31¢; rolled, 1 1/16 to 3 in., 11S-T3, 31¢ to 28.5¢.

Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5c to 29c; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41c to 30.5c; 75S-T6, 66¢ to 46¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ⅛ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Round Rod: M, diam., in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 1/8, $1.21; 1/8 to ⅜, $1.12; ⅜ to 1/16, 97¢; 0.058 to 0.064, 1/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	....
Commercial bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculoy, Olympic, etc.	37.24	37.50	38.56
Nickel silver, 10 pct.	41.80	42.68	40.54
5 pct	....	....	38.98
Architectural bronze	28.61	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	19⅛	18⅛
Yellow brass	15⅝	14⅝
Red brass	17⅛	16⅛
Commercial bronze	17⅝	16⅝
Manganese bronze	15¼	14¼
Leaded brass rod ends	15⅝	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper, wire..... 18.75
No. 2 copper, wire..... 17.75
Light copper 16.75
Refinery brass 16.50–16.75*
*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire..... 18.25
No. 2 copper, wire 17.25
Light copper 16.25
No. 1 composition.....14.50–14.75
No. 1 comp. turnings.....14.00–14.25
Rolled brass 11.00–11.25
Brass pipe 11.50
Radiators 12.00
Heavy yellow brass.....10.50–10.75

Aluminum

Mixed old cast..... 11.00
Mixed old clips..... 11.00
Mixed turnings 6.00
Pots & pans 11.75
Low copper 12.00

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire.. 16½—17
No. 2 heavy copper and wire.. 15½—16
Light copper ..... 14¼—14⅝
Auto radiators (unsweated)... 9¾—10⅛
No. 1 composition ..... 12½—13
No. 1 composition turnings..... 12 —12½
Clean red car boxes..... 9½— 9¾
Cocks and faucets..... 9½—10
Mixed heavy yellow brass..... 8 — 8⅛
Old rolled brass ..... 9½— 9⅝
Brass pipe ..... 10 —10⅛
New soft brass clippings..... 12¼—12⅝
Brass rod ends ..... 10 —10⅛
No. 1 brass rod turnings..... 9½—10

Aluminum

Alum. pistons with struts..... 5½— 6
Aluminum crankcases ..... 8¾— 9
2S aluminum clippings ..... 10 —10½
Old sheet & utensils ..... 9 — 9½
Dry borings and turnings..... 3½— 4
Misc. cast aluminum ..... 8½— 9
Dural clips (24S) ..... 8½— 9

Zinc

New zinc clippings ..... 8 — 8½
Old zinc ..... 5½— 5⅝
Zinc routings ..... 3 — 3½
Old die cast scrap..... 4 — 4½

Nickel and Monel

Pure nickel clippings ..... 16 —17
Clean nickel turnings ..... 12½—13
Nickel anodes ..... 16 —17
Nickel rod ends ..... 16 —17
New Monel clippings ..... 12 —13
Clean Monel turnings ..... 7 — 8
Old sheet Monel ..... 10 —10½
Old Monel castings ..... 7½— 8
Inconel clippings ..... 8 — 8½
Nickel silver clippings, mixed 8 — 8½
Nickel silver turnings, mixed 6½— 7

Lead

Soft scrap lead ..... 15 —15½
Battery plates (dry) ..... 9¼— 9½

Magnesium Alloys

Segregated solids ..... 8 — 9
Castings ..... 4½— 5½

Miscellaneous

Block tin ..... 75 —77
No. 1 pewter ..... 60 —62
No. 1 auto babbitt ..... 45 —47
Mixed common babbitt ..... 14¼—14½
Solder joints ..... 17⅛—17½
Siphon tops ..... 45 —47
Small foundry type ..... 17½—18
Monotype ..... 16¼—16½
Lino. and stereotype ..... 15½—16
Electrotype ..... 13½—14
New type shell cuttings..... 14½—15
Hand picked type shells..... 6½— 7
Lino and stereo dross..... 8 — 8½
Electro dross ..... 6 — 6½

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Steel prices on this page are the average of various f.o.b. quotations of major basing points: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	May 18, 1948	May 11, 1948	Apr. 20, 1948	May 20, 1947
Hot-rolled sheets	2.775	2.775	2.80	2.50
Cold-rolled sheets	3.495	3.495	3.55	3.20
Galvanized sheets (10 ga.)	3.906	3.906	3.95	3.55
Hot-rolled strip	2.775	2.775	2.80	2.50
Cold-rolled strip	3.535	3.535	3.55	3.20
Plates	2.93	2.93	2.95	2.65
Plates wrought iron	7.25	7.25	7.25	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes..	$6.70	$6.70	$6.80	$5.75
Tinplate, electro (0.50)lb)	5.90	5.90	6.00	5.05
Special coated mfg. ternes	5.80	5.80	5.90	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	2.875	2.875	2.90	2.60
Cold-finished bars	3.483	3.483	3.55	3.20
Alloy bars	3.213	3.213	3.30	3.05
Structural shapes	2.767	2.767	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	8.65	6.15
Wire: (cents per pound)				
Bright wire	3.608*	3.608*	3.55	3.30
Rails: (dollars per 100 lb)				
Heavy rails	$2.725	$2.725	$2.75	$2.50
Light rails	3.05	3.05	3.10	2.85
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00†	$45.00†	$45.00†	$42.00
Slabs, rerolling	45.00†	45.00†	45.00†	42.00
Forging billets	54.00†	54.00†	54.00†	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	3.025*	3.025*	3.025*	2.55
Skelp	2.887	2.887	2.90	2.35

†Net ton *Revised

Pig Iron: (per gross ton)	May 18, 1948	May 11, 1948	Apr. 20, 1948	May 20, 1947
No. 2, foundry, Phila.	$44.85	$44.85	$44.61	$36.51
No. 2, Valley furnace	39.50	39.50	39.50	33.50
No. 2, Southern Cin'ti	45.47	43.97	43.28	34.75
No. 2, Birmingham	39.88	37.38	37.38	29.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	33.00
Basic del'd Philadelphia	44.35	44.35	44.11	36.92
Basic, Valley furnace	39.00	39.00	39.00	33.00
Malleable, Chicago†	39.50	39.50	39.50	33.50
Malleable, Valley	39.50	39.50	39.50	33.50
Charcoal, Chicago	62.55	62.55	62.46	45.99
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$40.25	$40.25	$40.25	$29.75
Heavy mlt'g steel, Phila.	42.50	42.50	41.50	29.50
Heavy melt'g steel, Ch'go	39.25	39.25	39.25	29.25
No. 1, hy, comp. sh't, Det.	35.50	35.50	35.50	26.00
Low phos. Young'n	45.25	45.25	45.25	35.75
No. 1, cast, Pittsburgh	64.00	64.00	64.00	37.50
No. 1, cast, Philadelphia	67.00	65.50	65.50	41.00
No. 1, cast, Chicago	73.50	73.50	74.00	37.25
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$10.50
Foundry coke, prompt	14.00	14.00	14.00	11.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro. Conn.	21.50	21.50	21.50	21.50
Copper, Lake Conn.	21.625	21.625	21.625	21.625
Tin, Grade A, New York	94.00	94.00	94.00	80.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	17.30	17.30	17.30	14.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

Composite Prices . .

The figures for the first quarter 1948 have been revised to conform with actual first quarter shipments. Shipment data by American Iron & Steel Institute. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
May 18, 1948	3.24473¢ per lb.	$40.53 per gross ton	$40.66 per gross ton
One week ago	3.24473¢ per lb.	$40.20 per gross ton	$40.66 per gross ton
One month ago	3.27585¢ per lb.	$40.11 per gross ton	$40.33 per gross ton
One year ago	2.85664¢ per lb.	$33.15 per gross ton	$29.50 per gross ton

* Revised

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1948	3.27585¢ Feb. 17	3.22566¢ Jan. 1	$40.53 May 18	$39.58 Jan. 6	$41.83 Jan. 29	$39.75 Mar. 9
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9	18.21 Jan. 7	15.90 Dec. 16	15.00 Feb. 18	11.25 Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of deliverd prices at major ports. (1) Commercial quality sheet grade; primes, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Arbitrary delivered prices. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) from 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Deliverd Los Angeles; add 0.55¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases.

PRODUCTS	BASING POINTS											DELIVERED TO		
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	San Francisco, Los Angeles	Detroit[10]	New York	Philadelphia
INGOTS Carbon forging	$46.00	Rerolling ingots—$36.00 per net ton f.o.b. mill (Spot market as $75 to $90 per gross ton)												
Alloy	$56.00									Canton = $56.00				
BILLETS, BLOOMS, SLABS Carbon, rerolling[17]	$45.00	$45.00	$45.00	$47.00	$45.00	$45.00		$45.00						
Carbon forging billets	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00	(per net ton)							
Alloy	$66.00	$66.00				(Bethlehem, Massillon, Canton = $66.00)								
PIPE SKELP	2.85 to 2.90						2.90							
WIRE RODS	2.80 to 3.55	2.80 to 3.80		2.80 to 3.05	2.85						Worcester = 2.90	3.5245[13]		
SHEETS Hot-rolled[4]	2.75 to 2.80	2.75 to 2.80	2.75	2.80	2.75 to 2.80	2.80	2.75 to 2.80	2.80		Ashland, Ky. = 2.80		3.494[16] to 3.6875	2.96 to 3.01	
Cold-rolled[4]	3.45 to 3.50	3.45 to 3.55	3.45	3.50	3.55	3.55	3.55		3.65	3.50			3.71 to 3.76	
Galvanized (10 gage)	3.85	3.95	3.85 to 3.95		3.85 to 3.95		3.95	3.95	4.05	3.95	Ashland = 3.95	4.624[16]	4.11	
Enameling (12 gage)	3.85	3.75	3.75 to 3.85	3.95			3.95		4.05	3.85			4.11 to 4.16	
Long ternes[2] (10 gage)	4.05		4.05											
STRIP Hot-rolled[3]	2.80	2.75 to 2.80	2.75	2.75 to 2.80	2.75		2.75 to 2.80					3.554[16] to 3.9125	2.96 to 3.01	
Cold-rolled[4]	3.50	3.55 to 3.65	3.55	3.45 to 3.50			3.55			Worcester = 3.65)			3.71 to 3.76	
TINPLATE Cokes, 1.50 lb,[5] base box	6.70	6.70	6.70		6.80			6.80	6.90	(Warren, Ohio = $6.80)				
Electrolytic 0.25, 0.50, 0.75 lb, box	Deduct $1.00, 80¢ and 60¢ respectively from 1.50 lb coke base box price.													
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.													
BLACKPLATE, CANMAKING 55-70 lb, 75-95 lb, 100-128 lb	Deduct $1.60, $1.70 and $1.60 respectively from 1.50 lb coke base box price.													
BLACKPLATE, h.e., 29 ga.[11]	4.65	4.65	4.65					4.75	4.85					
BARS Carbon Steel	2.85 to 2.90	2.85 to 2.90	2.85	2.90	2.85 to 2.90	2.90	2.85 to 2.90					3.579[16] to 3.629[16]	3.06 to 3.11	
Reinforcing (billet)[7]	2.70 to 2.80	2.70 to 2.80	2.70		2.70		2.70					3.325[16]		
Cold-finished[4]	3.45 to 3.55	3.45 to 3.55		3.45									3.61 to 3.76	
Alloy, hot-rolled	3.20	3.20 to 3.30	3.20			3.30	3.20	Bethlehem, Massillon, Canton = 3.30						
Alloy, cold-drawn	4.00 to 4.10	4.00 to 4.10		4.00		4.10		Massillon, Canton = 4.10						
PLATE Carbon steel[12]	2.90 to 2.95	2.90 to 2.95	2.90 to 2.95	2.95	2.85 to 2.90		2.[illegible] to 2.95	Coatesville = 3.45, Claymont = 3.65 Geneva, Utah = 2.90				3.8375[14]		
Floor plates	4.05	3.95 to 4.05	3.95	4.05										
Alloy	3.70	3.70	3.70						Coatesville = 4.80					
SHAPES, Structural	2.75	2.75 to 2.80	2.75 to 2.80		2.75		Bethlehem = 2.80, Geneva, Utah = 2.75					3.424[16] to 3.49		
MANUFACTURERS' WIRE[9] Bright	3.45 to 3.80	3.45 to 4.05		3.45	3.45 to 3.55					Worcester = 3.55 Duluth = 3.50		4.4645[13]		
Spring (high carbon)	4.50	4.50		4.50						Worcester = 4.60 Trenton, Duluth = 4.75		5.5345[13]		
PILING, Steel sheet	3.30	3.30				3.30								

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt· Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	66.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.46	30.30	23.80	24.34	34.82	58.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.76
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.70¢ to 5.05¢
Electrical	5.20¢ to 5.45¢
Motor	5.95¢ to 6.30¢
Dynamo	6.65¢ to 7.50¢
Transformer 72	7.15¢ to 8.25¢
Transformer 65	7.85¢ to 9.20¢
Transformer 58	8.55¢ to 9.90¢
Transformer 52	9.35¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.55¢ for armature through and including 72, and 0.45¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, 100 lb and heavier, No. 1 O.H., per 100 lb	$2.70 to $2.75*
Joint bars, 100 lb	3.75
Light rails (from billets) per 100 lb.	3.05

* CF&I charges $3.05.

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.55¢
Tie plates, Pittsburg, Calif.	3.70¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

C-R SPRING STEEL

Base per pound f.o.b. Pittsburgh, Cleveland

0.08 to 0.40 carbon	3.45¢
0.41 to 0.60 carbon	4.95¢
0.61 to 0.80 carbon	5.55¢
0.81 to 1.05 carbon	7.05¢
1.06 to 1.35 carbon	9.35¢

Worcester, add 0.20¢

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad 10 pct, f.o.b. Coatesville, Pa.	21.50	....
Inconel-clad 10 pct, f.o.b. Coatesville	30.00	....
Monel-clad 10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base Column	San Francisco
Standard & coated nails*	91	112
Galvanized nails*	91	112
Woven wire fence†	97	120
Fence posts, carloads††	104	...
Single loop bale ties	94	118
Galvanized barbed wire**	111	131
Twisted barbless wire	111	...

* Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80-rod spools, in carloads. †† Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire†	$4.10	$5.1145
Annealed, galv. fencing‡	4.55	5.5645
Cut nails, carloads‡‡	6.15	...

‡ Add 10¢ at Worcester. ‡‡ Wheeling only, Pittsburgh add 15¢ (less 20¢ to jobbers).

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.45	4.55	4.55	4.45	4.55	4.45	4.55	4.55
Sheets									
Hot-rolled	4.30	4.20	4.30	4.50	4.20	4.30	4.20	4.30	4.30
Cold-rolled	5.30	5.20	5.30	....	5.20	5.30	5.20	5.30	5.30
Galvanized		5.90	....	....	5.90	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.20	4.30	...	4.20	4.30	4.20	4.30	4.30
Cold-rolled	....		5.30	....	....	5.30	5.30	5.30	5.301
Shapes	....	4.20	..	....	4.20	4.30	4.20	4.30	....
Beams	....	4.20	....	....	4.20	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.35	4.45	....	4.35	4.45	4.35	4.45	4.45
Bar shapes	....	4.35	....	....	4.35	4.45	4.35	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $900.00 per net ton

One producer allows 1 point less discount on steel buttweld.

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
⅛-in.	48	30½
¼-in.	51	34½
1-in.	53½	37½
1¼-in.	54	38
1½-in.	54½	38½
2-in.	55	39
2½ and 3-in.	55½	39½
Wrought Iron, buttweld		
⅛-in.	+11	+35
¼-in.	+ 1½	+25
1 and 1¼-in.	4	+16½
1½-in.	9½	+13
2-in.	10	+12½
Steel, lapweld		
2-in.	44½	28
2½ and 3-in.	48½	32
3½ to 6-in.	50½	34
Steel, seamless		
2-in.	43½	27
2½ and 3-in.	46½	30
3½ to 6-in.	48½	32
Wrought Iron, lapweld		
2-in.	1½	+20
2½ to 3½-in.	4	+16
4-in.	8	+10½
4½ to 8-in.	6	+12

Extra Strong, plain ends

Steel, buttweld		
⅛-in.	46	30
¼-in.	50	34
1-in.	52	37
1¼-in.	52½	37½
1½-in.	53	38
2-in.	53½	38½
2½ and 3-in.	54	39
Wrought Iron, buttweld		
⅛-in.	+ 6½	+29
¼-in.	+ ½	+23
1 and 1¼ in.	4	+16½
2-in.	10	+12½
Steel, lapweld		
2-in.	43½	28
2½ and 3-in.	48½	33
3½ to 6-in.	52	36½
Steel, seamless		
2-in.	42½	27
2½ and 3-in.	46½	31
3½ and 6-in.	50	34½
Wrought Iron, lapweld		
2-in.	4½	+16½
2½ to 4-in.	13	+ 6
4½ to 6-in.	9	+10½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD	Gage	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
in.	BWG				
2	13	$17.84	$20.99	$17.30	$20.36
2½	12	23.99	28.21	23.27	27.36
3	12	26.68	31.40	25.88	30.46
3½	11	33.35	39.26	32.35	38.08
4	10	41.40	48.70	40.16	47.24

CAST IRON WATER PIPE

Per net ton

6-in to 24-in., del'd Chicago $98.70
6-in. to 24-in., del'd New York 95.50
6-in. to 24-in., Birmingham 85.50
6-in and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 112.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

½ in. & smaller x 6 in. & shorter ... 45
9/16 & ⅝ in. x 6 in. & shorter 46
¾ in. & larger x 6 in. & shorter 43
All diam, longer than 6 in. 41
Lag, all diam over 6 in. long 44
Lag, all diam x 6 in. & shorter 46
Plow bolts 54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 43
9/16 to 1 in. inclusive 42
1⅛ to 1½ in. inclusive 40
1⅝ in. and larger 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	..	46
½ in. and smaller	44	..
½ in. through 1 in.	..	44
9/16 in. through 1 in. ...	43	..
1⅛ in. through 1½ in. ..	41	42
1⅝ in. and larger	35	

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate ..... 65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ in. and larger)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets (7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright 53
¾ to 1 in. x 6 in., SAE 1035, heat treated 44
Set screws, oval points 57
Milled studs 29
Flat head cap screws, listed sizes... 16
Fillister head cap, listed sizes 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	Base price per short ton
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer $6.60
Old range, nonbessemer 6.45
Mesabi, bessemer 6.35
Mesabi, nonbessemer 6.20
High phosphorus 6.20

Increases or decreases in freight rates, dock handling charges and taxes after Apr. 1, 1948, are to be added to above prices.

METAL POWDER

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags..... 7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe ..... 9.5¢ to 16.0¢
Electrolytic iron, annealed, 99.5+% Fe ..... 19.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe. 44.0¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe... 63.0¢ to 80.0¢
Carbonyl iron, minus 300 mesh, 98%, 99.8+% Fe.... 90.0¢ to $1.75
Aluminum ..... 23.0¢
Antimony ..... 44.0¢
Brass ..... 24.0¢ to 28.5¢
Copper, electrolytic ..... 30.625¢
Copper, reduced ..... 30.5¢
Cadmium $2.40
Chromium, electrolytic, 99% min. $3.50
Lead ..... 24.0¢
Manganese ..... 50.0¢
Molybdenum, 99% $2.65
Nickel, unannealed ..... 51.5¢
Nickel, spherical, minus 30 mesh ..... 53.0¢
Silicon ..... 29.0¢
Solder powder ..... 8.5¢ plus metal cost
Stainless steel, 302..... 75.0¢
Tin $1.01¾
Tungsten, 98%, 99%..... $2.90

COKE

Furnace, beehive (f.o.b. oven) Connellsville, Pa. ..... Net Ton $12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa. ..... 13.50 to 14.50
Foundry, Byproduct
Chicago, del'd $18.60
Chicago, f.o.b. 17.50
New England, del'd 21.75
Seaboard, Kearney, N. J., f.o.b.. 17.85
Philadelphia, f.o.b. 19.50
Swedeland, Pa., f.o.b. 19.50
Buffalo, del'd 21.75
Ashland, Ohio, f.o.b. 16.50
Painesville, Ohio, f.o.b. 19.45
Erie, del'd 19.95
Cleveland, del'd 17.90
Cincinnati, del'd 18.59
St. Louis, del'd 18.03
Birminham, del'd 16.71

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Carloads, Per 1000*

No. 1 Ohio $67.00
First quality, Pa., Md., Ky., Mo., Ohio 73.00
First quality, New Jersey 78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio 67.00
Sec. quality, New Jersey 70.00
No. 2 Ohio 59.00
Ground fire clay, net ton, bulk 10.50

Silica Brick

Pennsylvania and Birmingham $73.00
Chicago District and Alabama 82.00
Silica cement, net ton (Eastern) .. 12.50
East Chicago 13.50

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Plymouth Meeting, Chester $64.00

Magnesite Brick

Standard, Balt. and Chester $86.00
Chemically bonded, Baltimore 75.00

Grain Magnesite

std. ⅜-in. grains

Domestic, f.o.b. Balt. and Chester in bulk, fines removed $51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines 27.00
in sacks with fines 31.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢.. $11.05

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.47	$5.68	$5.92	$4.82	$5.90	$4.82	$4.54	$4.86	$5.73	$8.50	$7.15	$10.18	$10.38
New York	4.84	6.01[1]	6.16	5.08	6.36	5.11	4.80	5.06	5.94	8.68	8.83	10.35	10.50
Boston	4.83	5.69	6.23[12]	5.61	6.87	5.18	4.91	5.04	5.88	8.99	9.14	10.43	10.58
Baltimore	4.32	....	5.72	4.80	....	4.77	4.71	4.88	5.71	....	....	....	....
Norfolk	4.90	....	....	5.30	....	5.15	5.15	5.20	6.00	....	....	....	....
Chicago	4.25	5.10	5.68	4.35	5.45-6.65	4.60	4.40	4.40	5.10	8.20	8.38	9.50	9.65
Milwaukee	4.42	5.22	5.87	4.558	5.57	4.77	4.57	4.57	5.334	8.534	8.684	9.784	9.984
Cleveland	4.25	5.10[1]	5.82	5.05	5.95	4.60†	4.70	4.40	5.10	8.61	8.76	9.50	9.65
Buffalo	4.25	5.10	6.06	5.26	5.97	5.01	4.40‡	4.40‡	5.10	8.20	8.35	9.50	9.65
Detroit	4.41	5.26	6.07	4.77	5.67	4.92‡	4.82	4.86-4.82	5.26	8.82	8.97	10.09	10.24
Cincinnati	4.58	5.22	5.57	4.77	....	4.98	4.82	4.78	5.63	8.85	9.00	10.16	10.31
St. Louis	4.59	5.39	6.17	4.69	6.02	4.89	4.74	4.76	5.67	8.92	9.07	10.22	10.37
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
St. Paul	4.68	5.53	6.08	4.78	....	5.03	4.83	4.83	6.00	....	....	....	....
Omaha	5.262	....	6.712	5.362	....	5.612	5.412	5.412	6.112	....	....	....	....
Indianapolis	4.55	5.38	5.93	4.65	5.95	4.90	4.70	4.70	5.57	....	....	....	....
Birmingham	4.45[11]	....	5.80	4.45[11]	....	4.65[11]	4.46[11]	4.46[11]	6.13	....	....	....	....
Memphis	4.88[11]	5.94[1]	5.08[11]	....	5.23[11]	5.03[11]	5.03[11]	5.94	....	....	....	....	....
New Orleans	*5.05[11]	6.39[1]	....	5.25[11]	....	5.40[11]	*5.10[11]	*5.20[11]	6.39[6]	....	....	....	....
Houston	5.55	....	7.21	5.65	....	5.90	5.70	5.70	7.00	9.40	9.25	10.40	10.55
Los Angeles	5.79	7.26[1]	7.30	6.00	8.60[5]	5.35	5.15	5.45	7.25[14]	9.55[14]	9.45[15]	11.05[15]	11.20[15]
San Francisco	5.35[5]	6.55	6.95	5.70[5]	8.60	5.30	5.10	5.00	7.40	9.55[15]	9.45[15]	11.05[15]	11.20[15]
Seattle	5.45[4]	7.25[2]	7.10	6.15[4]	....	5.70	5.40[4]	5.65[4]	7.45[14]	....	9.70[15]	....	11.30[15]
Portland	5.70	7.25[2]	7.10	5.85[4]	....	5.70[4]	5.40[4]	5.85[4]	7.45[14]	....	8.95[16]	....	11.30[16]
Salt Lake City	6.40	..	7.85	6.70	....	6.20	6.35	6.55	7.55	....	..	....	..

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1800 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham.

† 1½ to 3½ in. thick and 90 in. wide.

‡ Add 41¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50	.....	Boston	Everett	$0.50 Arb.	.....	45.50	46.00	.....	.....
Birmingham	38.88	39.38	.....	.....	.....	Boston	Steelton	6.27	46.27	.....	.....	.....	52.27
Buffalo	40.00-42.38*	40.00-42.88*	40.50 43.38*	.....	.....	Brooklyn	Bethlehem	3.90	43.90	.....	.....	.....	.....
Chicago	38.50	39.00	39.50	40.00	.....	Cincinnati	Birmingham	6.09	44.97	45.47	.....	.....	.....
Cleveland	38.50-39.75*	39.00-40.25*	39.50-40.75*	.....	.....	Jersey City	Bethlehem	2.39	42.39	42.89	43.39	43.89	.....
Duluth	39.00	39.50	40.00	40.50	.....	Los Angeles	Provo	6.93	45.93	46.43	.....	.....	.....
Erie	38.50	39.00	39.50	40.00	.....	Mansfield	Cleveland-Toledo	3.03	41.53-42.78*	42.03-43.28*	42.53 43.78*	.....	.....
Everett		45.00	45.50	.....	.....	Philadelphia	Bethlehem	2.17	42.17	42.67	43.17	43.67	.....
Granite City	39.50	40.00	40.50	.....	.....	Philadelphia	Swedeland	1.31	46.31	46.81	47.31	47.81	.....
Neville Island	39.00	39.50	39.50	40.00	.....	Philadelphia	Steelton	2.81	42.81	.....	.....	.....	48.81
Provo	39.00	39.50	.....	.....	.....	San Francisco	Provo	6.93	45.93	46.43	.....	.....	.....
Sharpsville	39.00	39.50	39.50	40.00	.....	Seattle	Provo	6.93	45.93	46.43	.....	.....	.....
Steelton	40.00	.....	.....	.....	46.00	St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....
Struthers, Ohio	39.50	.....	.....	.....	.....								
Swedeland	45.00	45.50	46.00	46.50	.....								
Toledo	38.50	39.00	39.50	40.00	.....								
Troy, N. Y.	.....	.....	.....	.....	46.00								
Youngstown	39.00	39.50	39.50	40.00	.....								

* Republic Steel Corp. price. Basis: pig iron at Cleveland and Buffalo set by average price of No. 1 hvy. melt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $62.55. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	189.00
Delivered Pittsburgh	151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$51.00	$52.00
F.o.b. Pittsburg.h.	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C. 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe.	16.90	17.50	18.10
97% Si, 1% Fe.	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4-9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	19.45	19.85	20.00

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe r 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed	$2.31
Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.20
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb	
Ton lots	$2.50
Less ton lots	$2.55
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	95¢
Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo.	80¢
Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo.	80¢
Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo.	80¢
Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti	$1.21
Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti	$1.35
Less ton lots	$1.40
High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton	$152.50
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
Less ton lots	$1.25
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Carload lots	18.40¢
Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy	
Carload, bulk	6.00¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	7.20¢
Ton lots	7.70¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Car lots	9.50¢
Ton lots	10.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed

Ferroboron, 17.50% min. B, 1.50% max Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
	$1.20	$1.23	$1.31

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125	$1.8441

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	39.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	93¢
No. 6	63¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound	8.0¢

Borosil, f.o.b. Philo, Ohio, freight allowed. B 3%-4%, Si 40%-45%, per lb contained B | $6.21

FOLKS, they're just coming in too fast—and we *do* mean *orders!* In anything like normal times, we'd be awfully happy to have you pitch your order down our alley. Our past averages speak for themselves.

But *now*—well, honestly fellows—there are too many pitchers on that mound. We're in there swinging as hard as we can but we can only manage to get hold of a few. And there just aren't any pinch-hitters on the bench to help us out.

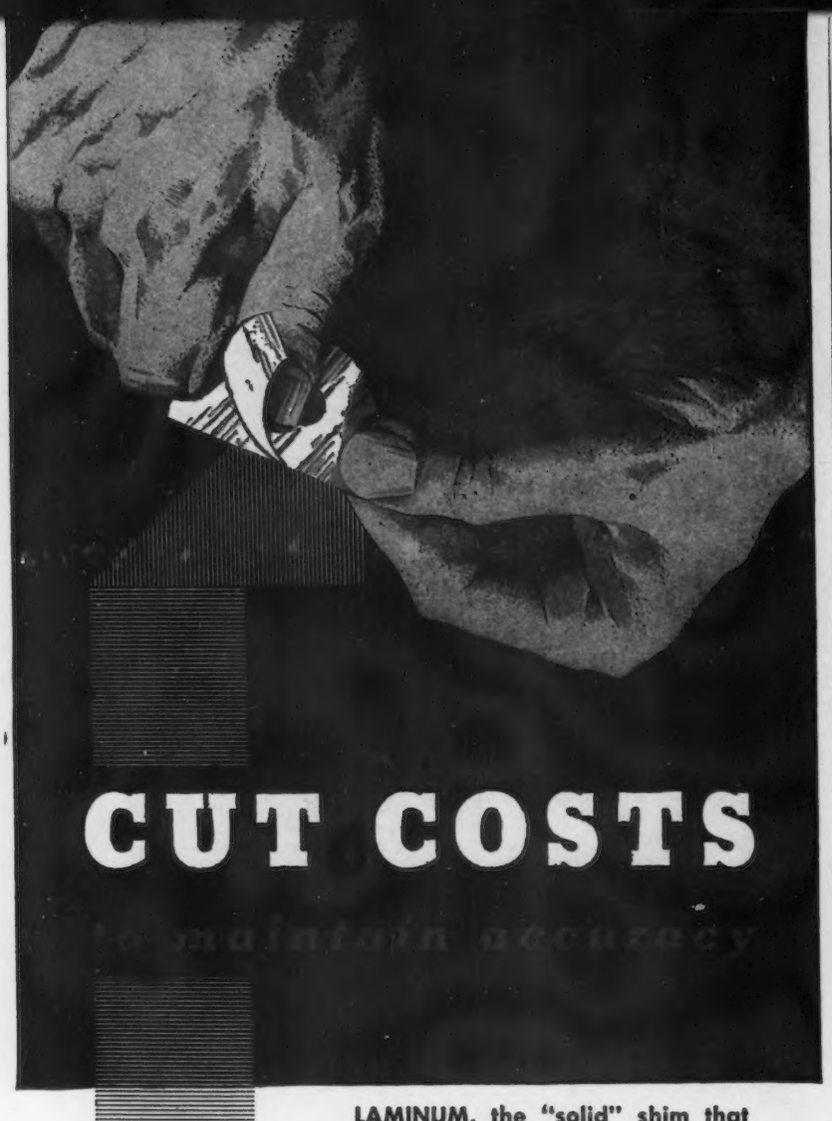
From your seat, our batting average no doubt looks weak at the present time. But we're doing the best we can and we're hitting 'em safe when we can get hold of 'em.

We're asking you to stick around for later innings when things settle down. That's when Wisconsin will really come through with those pay-off blows. Remember, the season isn't over yet. We hope we have a pennant winner for you.

WISCONSIN STEEL COMPANY

(Affiliate of International Harvester Company)
180 North Michigan Avenue Chicago 1, Illinois

WISCONSIN STEEL



LAMINUM, the "solid" shim that peels for adjustment, cuts costs by eliminating costly grinding to attain the close fit required for precision production and assembly.

Peel the required laminations of precision brass from LAMINUM. Without miking or filing, you will have correct shim thickness.

Costs are cut. Close tolerances are maintained. And, users' repair and maintenance time is reduced.

Write for data and application chart.

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LAMINUM shims are cut at our factory to your exact specifications. Shim stock for repair and maintenance work is sold exclusively through industrial distributors.

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LAMINUM
TRADE MARK

THE SOLID SHIM THAT peels FOR ADJUSTMENT

New Foundry Group Set In Pennsylvania

Cleveland

• • • **Gray Iron Founders'** Society has announced formation of a local society group of management executives in northeastern Pennsylvania, centering on Scranton and Wilkes-Barre. At a meeting in Scranton, the following officers of the newly organized group were elected: chairman, Kenneth F. Mills, J. W. Pinnell Foundry, Scranton; vice chairman, E. Kime, partner, Hallstead Iron Foundry Co., Hallstead, Pa., and secretary-treasurer, Edward Stuckie, J. Frank Seely & Sons, Clarks Summit, Pa.

R. L. Collier, executive vice president of the Society, who addressed the organizational meeting, described some startling new developments in the metallurgy of gray iron which may ultimately revolutionize the business.

Aluminum Boat Launched

London

• • • **The first light** metal alloy coastal craft to be completed in Britain, and probably the first in the world, has been launched for the Admiralty from the North Wales yard of Saunders Engineering & Shipyard Ltd., of Beaumaris. The craft, an experimental one, is to be known as M.T.B. 539. She is 75 ft. in length and has a beam of just under 20 ft. Its machinery is of normal internal combustion type and is sufficient to give her a high speed and good endurance.

The main interest in this craft lies in the fact that its hull, including frames and skin, is made of aluminum alloy. The hull is somewhat lighter than an equivalent hull of wooden construction. Such a saving in weight can be used to make possible increased speed, increased range or increased armament and equipment.

Shows Man-Hour Drop

Washington

• • • **Man-hours per unit** for production of general industrial machinery had dropped 3 pct in 1945 over time required in 1939, according to the latest survey by the Bureau of Labor Statistics.

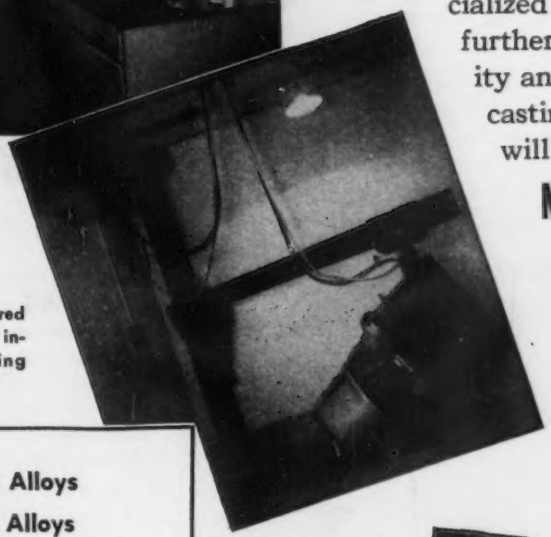
Greatest productivity gains were recorded in the field of bearings, transmission equipment, cranes, industrial trucks and engines. Figures for 1946-47 are expected to be completed by mid-summer

New MICHIANA Laboratory Building

houses Metallurgical and Testing Departments

Moving the metallurgical and testing departments into the new laboratory building at MICHIANA has been accompanied by the installation of the most modern facilities and equipment.

View of Michiana modernly equipped Laboratory and Balance Room.



250,000 volt, high-powered latest type Picker X-Ray installed in new Testing Laboratory.

The purpose is to insure still better MICHIANA Heat - Corrosion- and Abrasion-Resistant Alloy Castings. These new facilities under one roof with skilled personnel are available for general inspection and testing,—to study pilot casting,—for radiographic checking to determine specifications, quality, and furnish proof when required.

Such improved facilities plus the 30 years of specialized experience in Alloy Castings give further assurance that uniformity of quality and adherence to specifications of the castings supplied you by MICHIANA will be strictly maintained.

MICHIANA PRODUCTS CORPORATION
Michigan City, Indiana

MICHIANA
ALLOY CASTINGS

- Heat-Resistant Alloys
- Stainless Steel Alloys
- Abrasion-Resistant Alloys
- Ni-Resist—and
- High Temperature FANS

Booklet III contains illustrations, design and stress tables. Send for your copy today.

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There's a world of power in Ready-Power-equipped electric trucks and it's yours in any amounts needed to handle your jobs with utmost efficiency. Ready-Power gas-electric Units generate dependable electric current, in unlimited amounts, right on the truck chassis. Keep them working as many hours as you want. They won't slow down. Equip any make truck with Ready-Power.

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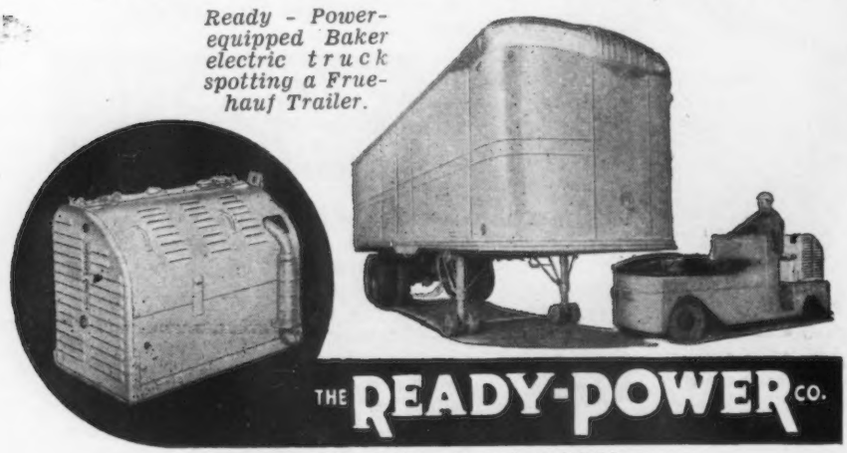

THE READY-POWER CO.

3822 Grand River Ave., Detroit 8, Michigan

Personals . . .

• **George E. Ford,** dean of the sales force of the A. P. Green Fire Brick Co., Mexico, Mo., has retired from active duty with the company. He came to A. P. Green in 1910.

• **Phil Huber,** president of the Ex-Cell-O Corp., has been elected to the board of directors of the Mid-West Abrasive Co., Detroit.

• **William H. Rex, Jr.** has been appointed industrial engineer for rayon manufacturing plants of Link-Belt Co., with his headquarters at the company's Philadelphia plant. Mr. Rex entered the Link-Belt engineering department at Philadelphia in 1915.

• **W. Tom ZurSchmiede, Henry C. Bogle** and **Earle C. Anthony** have been elected directors of Packard Motor Car Co., Detroit.

• **Edmund Hoffman** has been elected secretary and treasurer of American Can Co., New York, to succeed **R. A. Burger,** who has retired after 47 years with the company. Mr. Hoffman has been manager of the industrial relations department since 1944.

• **Thomas G. Eybye** has been named executive assistant to Graeme K. Howard, vice-president of the Ford Motor Co., Dearborn, Mich., in charge of the International Div. Mr. Eybye joined Ford after 22 years in overseas operations with General Motors.

• **L. H. Littlefield** has been appointed general sales manager for the Wolverine Tube Div. of Calumet & Hecla Consolidated Copper Co., Inc., Detroit. He was formerly affiliated with the Holtzer-Cabot Div. of the First Industrial Corp.

• **R. M. Dilworth** has been appointed engineering assistant to the vice-president, Electro-Motive Div. of General Motors Corp., La Grange, Ill., and will head the new separate engineering activity of the company. **E. W. Kettering,** formerly assistant chief engineer, has been appointed chief engineer, and **L. F. Campbell,** former chief production engineer, has been named executive engineer.

• **Noel L. Mudd** has been named assistant sales manager of Burroughs Adding Machine Co., Detroit. Mr. Mudd joined Burroughs

Michigan WELDED STEEL TUBING

The Modern Electric Resistance Welded Steel Tube

ROUND

¼" to 4" O.D. 9 to 22 gauge

SQUARE • RECTANGULAR

½" to 2" 20 gauge

1" to 2¼" 14, 16, 18 gauge

Michigan Welded Steel Tubing is available in sizes and shapes that make it readily usable in the production of a wide variety of parts.

Whether you form and machine the parts in your plant or order them prefabricated by Michigan, you will find this tubing exceptionally uniform in structure and adapted to reworking by any production process.

Michigan welded tubing can be:

Engineering advice and technical help in the selection of tubing best suited to your needs. Address inquiries to:

Michigan STEEL TUBE PRODUCTS CO.

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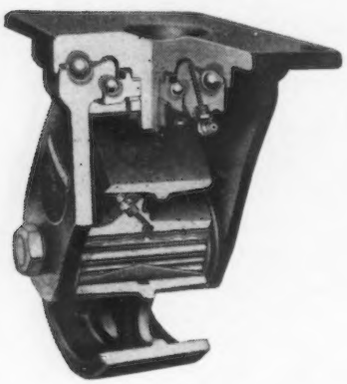
FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis and Minneapolis—Miller Steel Co., Inc., Hillside, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pitts-

Yes WITH STEEL-FORGED* CASTERS

It's fundamental that a man can push more than he can carry. So put your raw materials, your parts, your products, on wheels . . . on Rapids-Standard STEEL-FORGED casters. It's a really *better* way to do the job.



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The flame hardened drop forgings that make up top plate and yoke mean long life and freedom from "high failure costs". Anti-friction bearings in both wheel and swivel reduce human pushing charges. To meet the widest range of applications, there's a choice of steel, rubber or plastic wheels.

And, STEEL-FORGED casters are built by capable men . . . experienced men . . . who take pride in their work and in their product.

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355 Rapistan Bldg., Grand Rapids 2, Mich.

Representatives in principal cities

Rapids-Standard

STEEL-FORGED CASTERS

*T.M.

PERSONALS

in 1923 and has served in a number of sales capacities. Earlier this year he was made special representative in the sales department serving both United States and Canada.

• **Robert J. Barnett** has been named associate manager of the Rapids Handling Equipment Co., Grand Rapids. He had been associated with Rapids-Standard for the past 2 years.

• **Robert L. Ledbetter** has been appointed sales representatives in Texas and Oklahoma for the Buckeye Tools Corp., Dayton.

• **R. E. Cairns** has been appointed general manager of Waukesha Foundry Co., Waukesha, Wis., to succeed the late Roland F. Smith. Mr. Cairns has been with the company for 12 years, the last 7 of which he has filled the position of assistant general manager. He has been treasurer of the company for the past 3 years.

• **Charles A. Oostdyk, Jr.** has been appointed tank lining field engineer for the West Coast district of Goodyear Tire & Rubber Co.'s mechanical goods division, with his headquarters in Los Angeles. He joined Goodyear a year ago.

• **Lloyd L. Hook** has been named general manager of the Grand Rapids Metalcraft Div. of the F. L. Jacobs Co., Detroit, to fill the vacancy caused by the recent death of R. Wallace Hook.

• **J. Herbert Carson** has resigned his position as comptroller of Pittsburgh Steel Co., Pittsburgh, to become treasurer of Leslie Salt Co. with headquarters at San Francisco.

• **Charles T. Button** has been appointed vice-president in charge of sales of the Howell Electric Motors Co., Howell, Mich. He has also been elected to the board of directors. **Thomas J. Manning,** assistant to the president, has been named a vice-president.

• **F. J. Koegler** has been elected executive vice-president of the Doehler-Jarvis Corp., New York. He was formerly vice-president and controller of the corporation.

• **Vernon Woodside** has been appointed New Orleans district sales manager of the Mathieson Chemical Corp., and **Roland F. Boehm**

His eyes hold more than his belly can

There's a lot of talk about cutting inventories and reducing stocks.

Self-styled experts are forecasting lower prices and merchandise surpluses. They're warning about putting more on the inventory plate than can be sold.

Much of this talk is silly. Some of it is dangerous. Most of it is contrary to fact.

In most instances production has still not caught up to demand. Excessive inventories, where they exist, are mostly composed of items that are normally slow moving.

Today approximately 65% of the income of American industry is paid out to workmen as wages. *How, in view of rising payrolls and lagging production per man hour, can anyone anticipate widespread price cuts—soon?*

Our 1948 national income is estimated at over 200 billion dollars as compared to seventy-seven billion, five hundred forty-seven million in 1940. *Obviously, greater merchandise stocks are needed to handle this increased business.* Lack of these stocks can only lead to lost sales.

Maintenance of proper inventory is always a major business problem. *No business can profitably stock more goods than it can turn over in a reasonable period of time. But, neither can a business operate minus inventory.* You can't sell what you don't have!

The solution, to quote Junior, is—not to quit eating ice cream, but to put only as much on the inventory plate as can be eaten.

P&P—5038

David J. Bennell

Vice Pres., Charge of Sales

CLEVELAND CHAIN

Since DR 1869

THE CLEVELAND CHAIN & MFG. CO.
Cleveland 5, Ohio

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Security In Every Link

The *TIME* to consider the cost of belt maintenance is when you buy a new belt. If, by paying a few cents more to get quality, you can get more years of trouble-free operation; *that's good business.*

The *WAY* to get a minimum maintenance belt is to specify Schieren Duxbak. Here's why a Schieren Duxbak drive costs you *less per foot per year.*

LESS STRETCH — Freedom from uncombined tanning materials lets internal fibers draw down nearer parallel during the currying operation . . . reducing stretch.

GREATER LOAD CAPACITY AT LOWER TENSION—The clean, full grain surface of Schieren Duxbak belt assures better pulley grip, enabling the belt to do more work with less strain. Result—longer belt life and less wear on bearings.

Write for information on belting, leather packings or leather specialties of all types.

SC-23

CHAS. A. SCHIEREN COMPANY
26 FERRY STREET, NEW YORK 7, N.Y.
60 Front Street, W., Toronto, Ont.
Tanners and Manufacturers Since 1868
80 Years in Business
Branch Offices in Chicago, Dallas, Denver, Detroit, Newark, New York, Philadelphia Pittsburgh, Salt Lake City

has been made Houston district sales manager. Mr. Woodside joined the Mathieson organization in 1936 as a member of the sales development and technical service department, and until his present appointment specialized in technical service to the pulp and paper industry. Mr. Boehm has been with Mathieson since 1946. He succeeds **W. S. Hammond,** who died recently.

• **Harry Bernard** has been appointed chief engineer of Mack Trucks, Inc., New York, replacing **W. M. Walworth,** who has resigned. Mr. Bernard has been director of service and service engineering for the past 3 years. **John Walker** has been made manager of off-highway and mining truck sales of Mack Trucks, Inc. For the last three years he has been manager of the company's sales engineering department.

• **C. M. Adams, F. H. Drummond** and **Robert Twells** have been named vice-presidents of the Electric Auto-Lite Co., Toledo. Mr. Adams will serve as plant manager of the Bay City, Mich. division of Auto-Lite. He has held that post since the plant was opened. Mr. Drummond, who came with Auto-Lite when the Alemite Die Casting Co. was purchased, will be in charge of all die-casting operations. Mr. Twells, who came to Auto-Lite in 1935, is now manager of spark plug operations in Fostoria, Ohio.

• **John J. Heuther** has been named manager of the transportation division of General Electric Co.'s apparatus department, Schenectady. Mr. Heuther has been assistant manager of the industrial divisions since 1945.

• **Miles S. Wright** has been appointed superintendent and **Charles E. Stroud,** assistant superintendent of Pittsburgh Plate Glass Co.'s new "Twindow" plant at Creighton, Pa. Mr. Wright joined the firm in 1930 as a plant engineer, and in 1940 was promoted to assistant department superintendent. Mr. Stroud has been associated with the firm since 1925. **A. E. Cutler** has been appointed superintendent of Pittsburgh Plate Glass Co.'s Pittco store-front metal producing plant at Kokomo, Ind., succeeding **Clyde J. Bristow,** who has retired. Mr. Cutler has been serving as assistant superintendent at the Kokomo plant since last May.

• **William W. Evans** has been appointed general sales manager of Power-Pak Products, Inc., Buffalo.

• **William R. Klinkicht** and **Carl L. Volkman** has been elected to the board of directors of the Pollak Steel Co., Cincinnati.

• **E. J. Kanker** has been appointed manager of the Chicago branch for Bendix Home Appliances, Inc. For 18 months Mr. Kanker has served as manager of the department store division for Bendix Home Appliances. He succeds **A. L. McCarthy,** who has resigned.

• **George F. Hallman,** formerly of Luria Bros. for 22 years, has become associated with Southwest Steel Corp. at Memphis, Tenn.

• **Worden W. Gentino** has been appointed Billings & Spencer Co.'s representative in the Chicago territory.

• **Arnold Leavitt** has been appointed purchasing agent of the Fresh'nd-Aire Co., Chicago.

• **George A. Meyer** has been appointed vice-president of Hamilton Art Metal Corp.'s diecasting division, New Hyde Park, N. Y.

• **L. H. Nagler** has been appointed technical adviser for Nash Motors Div. of Nash-Kelvinator Corp., Detroit. Mr. Nagler was formerly associated with General Motors research laboratories, Oldsmobile Div. and GM Transmission Div. He was also associated with J. I. Case Co. and from 1945 until 1948 he was technical editor of Motor Magazine.

• **Joseph P. Wright,** formerly treasurer of Western Foundry Co., Chicago, has been elected vice-president in charge of sales, and **Frank D. O'Neil,** formerly assistant to the president, has been elected treasurer.

• **Robert LeFevre** has been named to the Minneapolis district merchant trade sales staff of the Ceco Steel Products Corp.

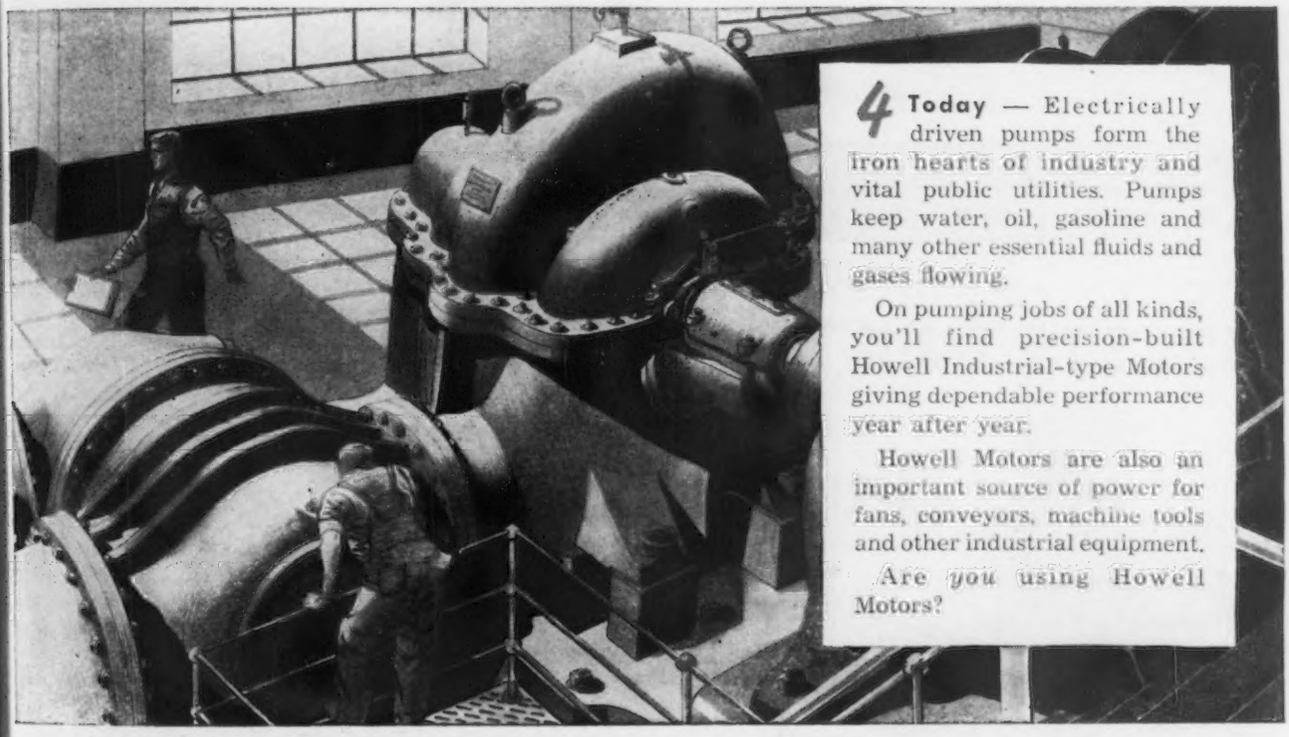
• **L. P. McAllister** has been appointed manager of steel plants of Lukens Steel Co., Coatesville, Pa. Mr. McAllister joined Lukens Steel in 1922. He has served successively as assistant manager of tests, engineer of tests, metallurgical sales engineer and metallurgical engineer until 1944, when he was ap-

1 1643—Torricelli, Italian physicist, hastened the development of modern hydraulic pumps when he found water could be raised in a tube by air pressure.

2 1840—Steam pump engines were helping to keep water out of mines. But low-cost electricity which put the *big* push behind pumping was still to come.

3 1915—Howell "Red Band" Electric Motors were introduced. Soon, these rugged, industrial-type motors gained wide recognition in this and other industries.

PUMPS . . . IRON HEARTS OF INDUSTRY!



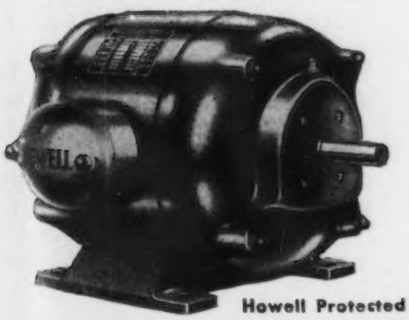
4 Today — Electrically driven pumps form the iron hearts of industry and vital public utilities. Pumps keep water, oil, gasoline and many other essential fluids and gases flowing.

On pumping jobs of all kinds, you'll find precision-built Howell Industrial-type Motors giving dependable performance year after year.

Howell Motors are also an important source of power for fans, conveyors, machine tools and other industrial equipment.

Are you using Howell Motors?

Here's another precision-built Howell Motor . . . industrial type with copper or bronze bar rotors . . . specially insulated . . . statically and dynamically balanced.



Howell Protected Type Motors

HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915

High Grade
ROLLER DIES

To Form Tubes . . . .
Pipe and Cold Rolled Shapes

Our efficient manufacturing methods assure quality, performance and lower tooling cost.
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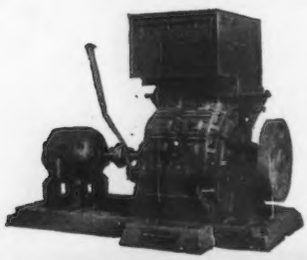
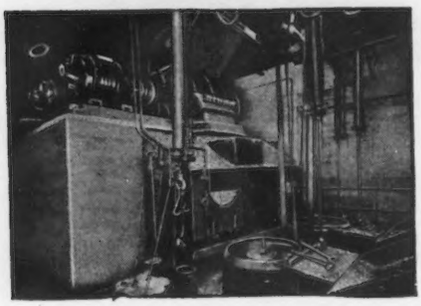
SALVAGE THE PROFIT IN SCRAP TURNINGS
with an
AMERICAN METAL TURNINGS CRUSHER





You can save time and labor in handling, greatly reduce storage space, increase cutting oil reclamation, and obtain better briquetting, with an American Crusher. Hard-to-handle turnings from alloys, carbon steel, aluminum, brass, copper, or bronze—all reduce to uniform size chips when crushed by Americans. Features include the American Rolling Ring principle of crushing, with the patented Shredder Rings, and the Automatic Apron. Capacities up to 10 TPH.

American installation in cutting oil reclaiming plant

PATENTED MANGANESE STEEL SHREDDER RINGS

Write for Metal Turnings Bulletin

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
1439 Macklind Ave., St. Louis 10, Mo.

—PERSONALS—

pointed assistant to the general superintendent. He was named assistant general manager of steel plants in 1947.

• **H. M. Albers** has been appointed assistant sales manager of the Kensington Steel Co., Chicago.

• **Howard G. Seaman** has been promoted to sales manager of the Electro-Textile Div. of Behr-Manning Corp., Troy, N. Y. He has been associated with Behr-Manning for over 28 years, and for the last 14 years was manager of sales planning. **H. J. Sidford** replaces Mr. Seaman as manager of sales promotion. Mr. Sidford has been with the company for 19 years.

• **Walter Webb** has been appointed sales representative for the Philadelphia area of the U. S. Stoneware Co., Akron, Ohio. Before his association with U. S. Stoneware, he was general superintendent of Ralph V. Rulon, Inc.

• **Howard H. Weber** has been named chief engineer of the wire and cable department of U. S. Rubber Co., New York, and **A. S. Basil** has been appointed general sales manager of the department. Mr. Basil has been associated with the company since 1926 and Mr. Weber since 1934. Other changes are as follows: **H. J. MacDonald** has been appointed assistant to the manager; **H. F. Johnson,** assistant general sales manager; **R. A. Walker,** merchandise manager; **J. A. Leuver,** assistant sales manager in charge of distribution; **D. B. Karlskind,** assistant sales manager in charge of commodities, sales engineering and new projects; **G. E. Hubrig,** sales manager, western division; **C. A. Bartron,** chief sales engineer; **A. E. Aune,** manager, automotive and aircraft wire sales, and **R. C. Cassidy,** manager, Uskon sales.

• **J. W. Brown** has been named manager of Oil Well Supply Co.'s store at Bakersfield, Calif.

• **Maynard B. Terry** has been appointed general sales manager of the American Brakeblok Div. of the American Brake Shoe Co., New York. Mr. Terry, formerly manager of equipment sales, has served in various sales capacities since joining the Brake Shoe Co. in 1943. He will continue to be located at the division's headquarters in Detroit.

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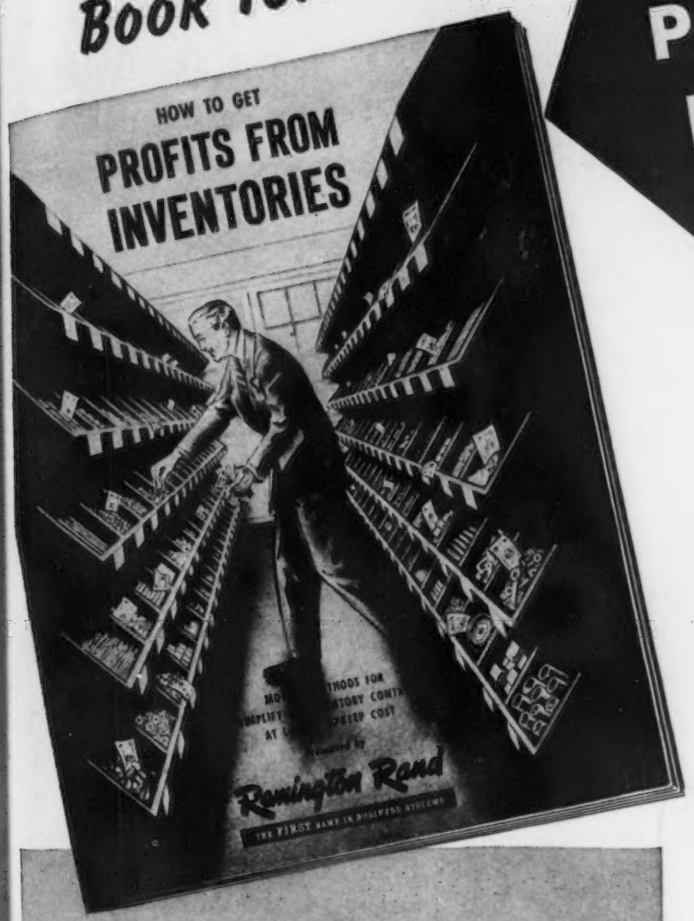

- **How to keep inventories in balance with demand.**
- **How can we achieve the ideal Turnover Rate for our business?**
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Today, more than ever before, it is imperative *to anticipate trends* in demand — *to order more* of those items on which volume is increasing — *to reduce buying* where demand is slackening. Today, you need much more than a record of stock-on-hand and on order. You need a real *control* over inventory — a control sensitive to the fluctuating requirements of every item — a control that will force attention and action **to cut down loss-producing overstocks and prevent profit-killing understocks.**

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IA7

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Shaft Volume Increased With Electric Duplicator

Shaft production has been increased five times by a new electric duplicating attachment recently introduced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. This new device, which operates on the template-tracer principle, has cut machining time from 30 minutes to 6 on one job alone. It is excellent for profile facing as well.

The new duplicator can be installed in ten minutes on any Regal or Dual Drive without drilling or fitting, and can be plugged into the nearest light socket. It is controlled by electric push buttons.

It brings automatic sizing to Regals and Dual Drives, and will perform every duplicating function with accuracy of .0015" to .002".

For full information on this time- and labor-saving device, send for bulletin EC-1. The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

(Advertisement)

NEWS OF INDUSTRY

Union Goes To School To Improve Bargaining Ability Through Study

Pittsburgh

• • • **Each year as basic** steel and fabricating companies sit down to discuss wages with the Steelworkers they find themselves talking to more experienced men. Spokesmen for the Steelworkers say their educational policy is one reason. In the past 2 years almost 1700 members have "graduated" from union sponsored 1-week courses on nine college campuses. Others take extension courses sponsored by union locals. Special weekend cram sessions like two recently held at Birmingham and Canton, Ohio draw over 100 "students" apiece.

The weekend courses cover only collective bargaining, the union in the community and current labor law. At the 1-week summer courses the curricula branches out. It includes the history of labor, time study and job evaluation, how to conduct a union meeting and some applied psychology. Local presidents, secretaries, and grievance committeemen make up the majority of the students.

Though not intended as a training ground for all negotiators these classes may be the only practical training given to many men who will sit in on collective bargaining conferences for the first time this year. Before the end of May there will have been over 600 separate bargaining conferences. These men will know their rights and they'll know some labor history. They may be a little sharper talkers than they were. But they may also have learned that discussion around the conference table can often be as effective as striking.

Are the courses popular? The union cites the fact that local unions paid transportation, tuition, room and board for most of the 1700 who attended the 1-week summer sessions. It amounted to about $50 apiece. Some went on their own initiative and at their own expense. Polls show collective bargaining, the union in the community and labor law as the most ppular subjects.

The program at Penn State, Pa., last July is typical. There, four 1-week sessions were held with about 65 students in each. Instructors were from the college's engineering and liberal arts faculties aided by some visiting professors—labor re-

When

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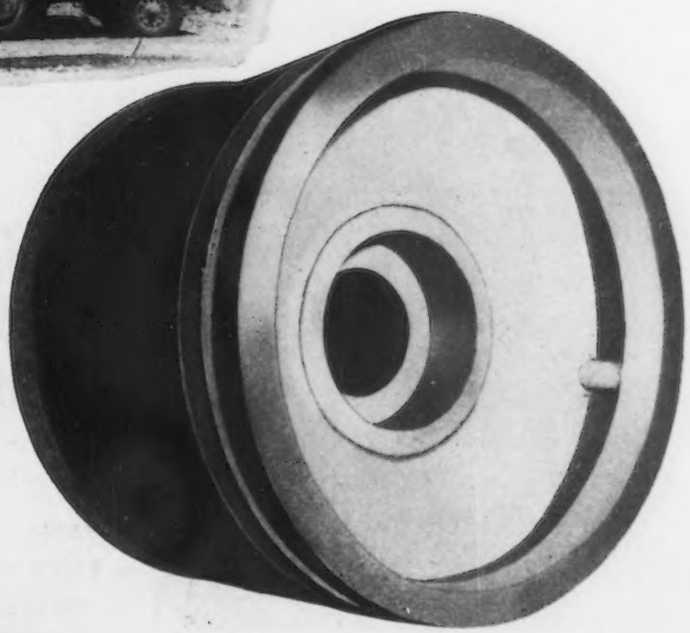

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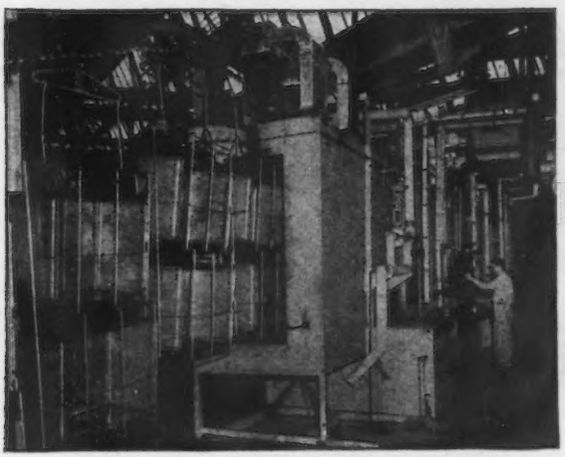

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in one continuous operation

Above is a METALWASH Spray Pickling Machine operating in the plant of a leading refrigerator manufacturer. This machine accomplishes the complete cleaning and pickling operation prior to porcelain enameling. Handling problems are eliminated, adherence qualities are improved, production is increased and control is facilitated. The housing, equipped with an efficient venting system, eliminates obnoxious fumes and vapors and promotes ideal working conditions.

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lations specialists. The course of study was worked out by the college faculties in cooperation with the USWA's department of education and publicity, headed by Vincent Sweeney.

No one in the union is naive enough to think that its bargaining tactics, time study and handling of grievances will be affected overnight by the program. The steelworkers' educational plans are on a long term basis, though next summer's schedule will be somewhat curtailed because of convention expense. Even so, new courses are planned for Salt Lake City and for Colorado. The idea is not to qualify only local heads but members of grievance committees, bargaining committees and time study men.

Courses were given last summer at Pennsylvania State College and at the Universities of Illinois and Michigan, at Kansas, New Hampshire and Wisconsin Universities, at Antioch College and at the University of California, Los Angeles and Berkeley.

Courses included:

The Union and the Community: Good community relations to win public support and community services.

Labor Legislation: How laws are made, the right to picket, the injunction, the Taft-Hartley Act.

Collective Bargaining: The agreement and how it is made, how negotiations break down, strikes and lockouts, grievance procedure, job security, seniority, wage scales, technological changes, union-management relations.

Arbitration: Procedure, types, interpretation, selection of arbitrator.

Personal Adjustments: Elementary applied psychology.

The Union Meeting: Public speaking and parliamentary law.

Job Standardization: Motion and time studies, wage incentives.

Job Evaluation: Wage and salary administration, job rating.

Reports Net Earnings

Cleveland

• • • **Net earnings of** Midland Steel Products Co. for first quarter, 1948, were $711,001, after all charges, including estimated provision for federal income tax of $425,000. Net is equal to $2.09 per common share, which compares with $1.36 in the first quarter of 1947.

The Governor of Utah *invites You*

STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY

HERBERT B. MAW
GOVERNOR

To American Industry:

The State of Utah takes pleasure in presenting to American Industry an opportunity for new development and expansions.

The State of Utah prides itself on the quality of its people, the tremendous extent and ready availability of its raw materials, its unlimited power resources, its unequaled transportation facilities, and its friendly attitude toward business.

These factors, together with the advantages of living under ideal home surroundings in the nation's most interesting area, has already induced many fine industries to locate in our State.

A new industrial economy is developing in our commonwealth based on the substantial foundations of the basic materials available and the happy and contented people constituting the human resources.

The establishment of your business in Utah will give you an opportunity to share in this new industrial economy and to participate in the growth already experienced in the west.

Sincerely yours,

Governor

Herbert B. Maw

** One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.*

Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.

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Just as a famous chef jealously guards the recipe for his masterpiece, so we guard the formula for *Strenes Metal*. That's why no other foundry produces *Strenes Metal* castings.

This isn't mere selfishness on our part. What concerns us is maintaining the quality of *Strenes Metal* dies and other types of castings. We gladly assume full responsibility for the character and behavior of *Strenes Metal* products because we control them.

Our customers come from far and near to enjoy the excellence of *Strenes Metal* cookery!

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METAL
FOR DRAWING AND FORMING DIES

Reorganization Plan For Sterling Engine Co. Now Announced

Buffalo

• • • **Common stockholders** of the Sterling Engine Co. have organized a committee to work out a reorganization plan to save the company from bankruptcy. The announcement by Irving M. Felt of New York City, chairman, said it was planned to present a program to the federal court here designed to "reflect equitably the positions of creditors, preferred and common stockholders, and to provide adequate working capital for the company which has a large volume of actual and prospective orders for the marine and industrial fields, and the U. S. government."

Sterling filed a petition in federal court Feb. 7 for an arrangement with creditors under the Chandler Act and Manly Fleischmann, Buffalo attorney, was named receiver. Early this month a group of creditors asked the court to declare the company bankrupt as a step toward its eventual sale. May 3 was set for hearing of the petition.

Last week the receiver announced that March operations after deduction of all costs, expenses and charges, including depreciation, showed a net profit of $9,910, compared with net losses of $58,368 in January and $10,501 in February. He also reported that indebtedness to the Manufacturers Trading Corp. of Cleveland had been reduced from $452,428 to $190,404 since his appointment as receiver.

Other members of the stockholders' committee are Charles R. Diebold, Buffalo banker; H. Struve Hensel, former assistant Secretary of the Navy; John J. Bergen, a director of Gar Wood Industries, and Thomas J. Dolan, president of the American Floor Surfacing Machine Co., Toledo.

Free Lead Imports Proposed

Washington

• • • **A bill** (HR 6375) introduced by Chairman Knutson, R., Minn., of the Ways and Means Committee, provides for the free importation of lead until June 30, 1949, with respect to imports entered for consumption or withdrawn for consumption.

The suspension of import duties would apply to the following products: lead-bearing ores, flue dust, and mattes of all kinds, lead bullion or base bullion, lead in pigs and bars, lead dross, reclaimed lead, scrap lead, antimonial lead, antimonial scrap lead, type metal, babbitt metal, solder, all alloys or combinations of lead.

***BALING PRESS**—Built to the design of Jerry Williams, owner of the A-1 Iron and Metal Co., South Gate, Calif., this 500-ton press is currently chewing its way through a five acre scrap pile at his yard.*

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CHASE BRASS & COPPER CO.
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Only with Chase free-cutting Brass Rod do you know where you Stand!

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Your machine is set up.

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You open the package . . . and all the Chamfered ends are facing the way you want them to—because the rod you're using is Chase Free-Cutting Brass Rod!

With Chase Free-Cutting Brass Rod, you know where you stand right from the start. There is no awkward, troublesome, time-consuming shuffling around in a crowded shop.

Because, as another special Chase service, every pack of free-cutting brass rod is stacked with all Chamfered ends in one direction—*and each case is clearly marked.*

That's typical of Chase service. Couple this kind of care with the fact that *no finer quality free-cutting brass rod is made* . . . and you can see why it pays to specify Chase every time.

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Tin Group Revising Needs Downward Due To Low Production

Washington

• • • **The International** Tin Study Group at a meeting last week estimated the world mine production of tin at 150,000 long tons for 1948, 170,000 long tons for 1949, and 200,000 long tons for 1950. These figures were smaller than those estimated (namely, 163,000 tons for 1948, and 201,000 tons for 1949) at the 1947 Group Meeting. These reduced estimates reflected the difficulties faced in rehabilitating the Far Eastern tin mines, and some reduction in the tonnages estimated from other sources.

The potential industrial consumption of tin was estimated at 190,000 tons for 1948, 1949, and 1950, providing tin were freely available, and restrictions on the use of tin were removed.

The meeting was attended by 73 delegates or observers from Australia, Belgium, Bolivia, British Colonies, Canada, China, Czechoslovakia, France, India, Italy, Netherlands, Siam, United Kingdom, United States, United Nations, Pan American Union, the International Bank for Reconstruction and Development, and the Tin Research Institute.

The principal objects of the meeting were: to review the world tin situation since the April 1947 meeting; to examine the statistical position regarding production, consumption, and stocks of tin throughout the world; and, to receive reports on the operations of the Group's Management Committee, and of the Secretariat, during the fiscal year 1947-48.

Jack & Heintz Aims At Subcontract Work

Cleveland

• • • **Stockholders of** Jack & Heintz Precision Industries, Inc., at their annual meeting, held May 3, elected ten candidates, including eight present members, to the board of directors.

The new board, which will serve for the coming year, consists of incumbents Byron C. Foy, Ralph M. Heintz, Robert Heller, E. R. Legg, B. C. Milner, Jr., A. A. Ricker, Joseph E. Rogers and Reber C. Stupp, and of H. Chapman Rose and Raymond M. Tierney, elected for the first time. Both newcomers are attorneys, Mr. Rose being a member of the Cleveland law firm of Jones, Day, Cockley & Reavis and Mr. Tierney a member of the New York law firm of Jackson, Nash, Brophy, Barringer & Brooks.

Mr. Foy, chairman of the board and president, announced that the company anticipates a substantial increase in production and sales of its aircraft starters, generators, inverters, actuating and retraction motors, auxiliary power units, etc., and is expanding its engineering staff to expedite the fulfilment of new contracts.

Sales of the company's Eisemann magneto also are on the up-grade, Mr. Foy added, but indications point to reduced volume in the other commercial products. With that prospect in mind, efforts are being expended toward development of new Jack & Heintz products for direct consumer sale, as distinguished from the company's current products.

To enable a fuller immediate utilization of plant facilities, the company is actively negotiating for subcontract work. Production is

Midwest Piping Reports Record Peacetime Net

St. Louis

• • • **Midwest Piping & Supply Co.** had net sales of $19,169,666.49 for the fiscal year 1948, it was disclosed in the annual report issued recently. The company, which fabricates piping and produces welding fittings for utilities, refineries and other major industries, reported sales volume greater than for any other peacetime year.

Net profit was $1,895,966.13, the equivalent of $4.91 per share of common stock and 9.89 pct of volume of sales.

The firm's construction division, which erects piping systems fabricated by Midwest, installed piping for utilities and other major industries in 27 states in all sections of the country, the report states.

In spite of the year's critical steel shortage, it is reported, each of the company's four plants in St. Louis, Boston, Passaic, N. J., and Los Angeles, continuously operated to capacity on a single shift basis.

PERMANENT MARKING
at higher production speeds
Permanent precision marking and high production speeds have made Noblewest equipment the universal standard. Employing the famous Noblewest rolling process, these machines are engineered to mark metal, plastic, hard rubber and wood products. Model 157, illustrated, can be tooled for marking many sizes and shapes of pieces. Has pneumatic die pressure with absolute uniformity of impression, and automatic unloading feature. For further information on this and other models write Noble & Westbrook Manufacturing Co., 22 Westbrook Street, East Hartford 8, Conn.
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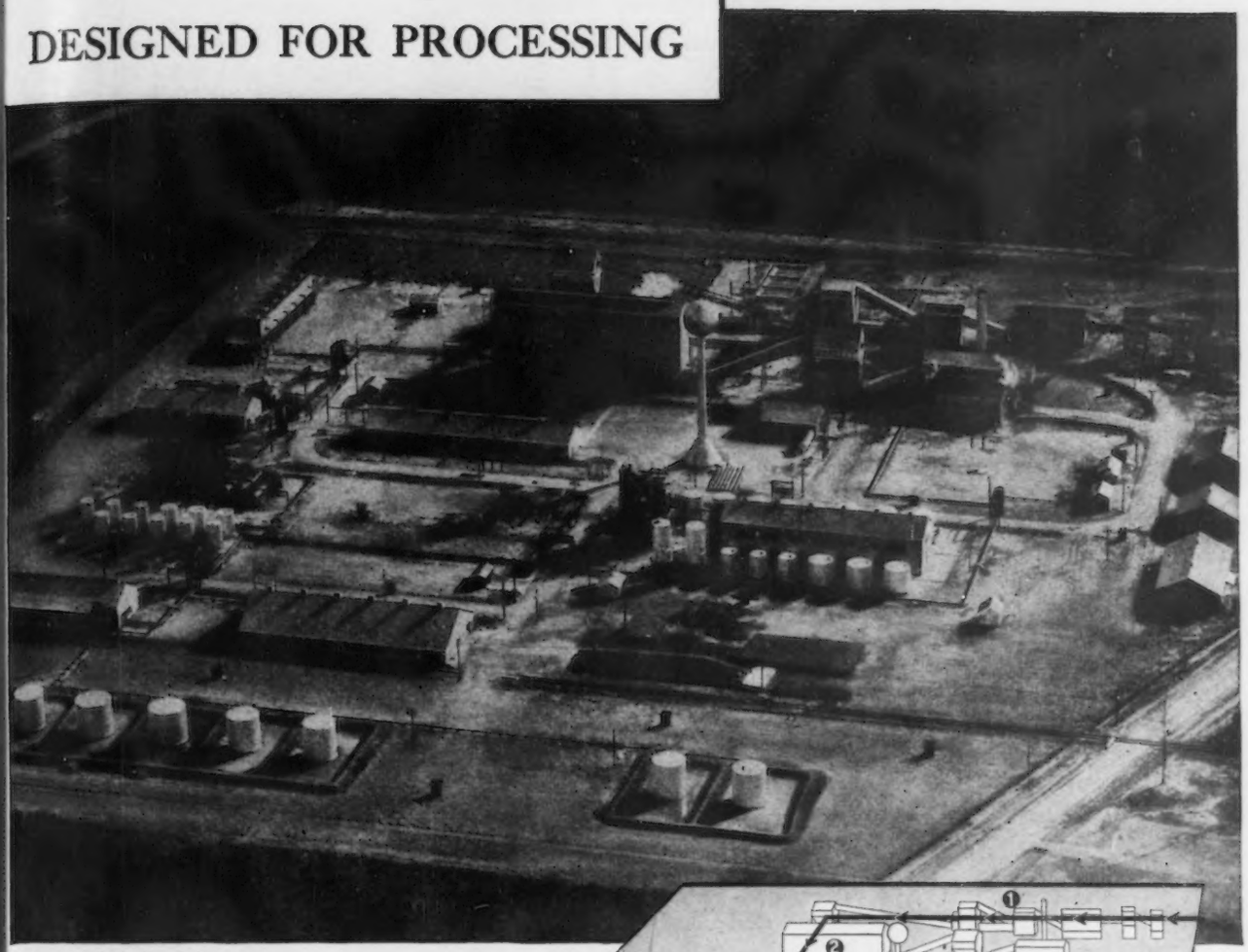

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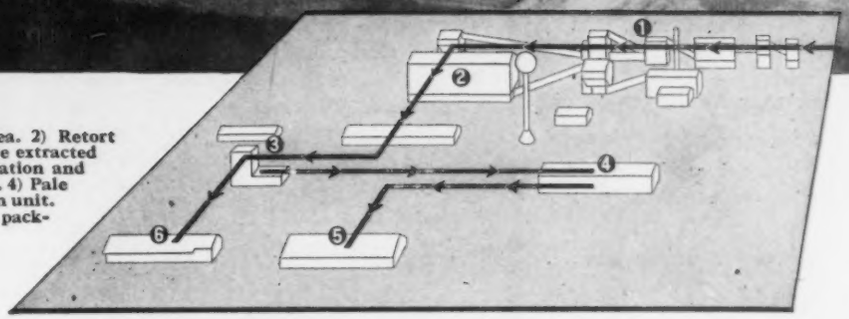

1) Wood preparation and grinding area. 2) Retort building where terpenes and rosins are extracted by solvent. 3) Finishing unit for distillation and separation of solvent, terpenes and rosins. 4) Pale rosin decolorization and solution evaporation unit. 5) Rosin packaging building. 6) Oil loading and packaging building.

The Naval Stores Extraction Plant for Newport Industries, Inc., at Oakdale, Louisiana, provides for complete processing of pine stumps, from wood preparation to decolorizing rosin and packaging rosins and terpenes for shipment. Newly developed applications of continuous flow processing, and efficient fractionation result in products of the highest obtainable quality. This plant, with related facilities, was designed and constructed by Stone & Webster Engineering Corporation in collaboration with the engineers of Newport Industries, Inc.

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4. Cleaner, brighter wire.

5. Increased production.

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Canadian Output Is Well Above Previous Year During February

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of February totalled 281,052 net tons as compared with 290,804 tons in January and with 257,556 tons for February, 1946. Output for February included 268,497 tons of carbon steel shapes and 12,555 tons of alloy steel shapes. In the production figures for February are included 72,414 tons of shapes shipped to producers own plants or plants within the primary industry for further processing.

Shipments for sale of primary iron and steel shapes in February amounted to 203,779 tons of which 191,630 tons were carbon steel shapes and 12,149 tons alloy steel shapes; in January shipments totalled 231,329 tons and included 220,630 tons of carbon and 10,606 tons of alloy steel shapes, and for February, 1947, shipments amounted to 203,924 tons including 196,316 tons of carbon and 7,608 tons of alloy steel shapes.

The following table shows production and shipments for sale of primary iron and steel shapes for the month of February in net tons:

February 1948	CARBON STEEL		ALLOY STEEL	
	Made	Shipped	Made	Shipped
Billets, etc., for forging	6,721	2,878	2,328	2,225
Other semi-finished shapes, not for re-rolling by makers	30,479	99	209	...
Structural shapes and piling	14,942	14,093	...	...
Plates	17,875	17,372	88	73
Rails	19,451	19,123	...	...
Tie plates and track material—				
Splice bars	5,005	3,800	...	...
Tie plates	3,212	3,058	...	...
Spikes	1,184	1,118	...	...
Concrete reinforcing bars	4,949	5,091	...	...
Hot rolled bars for cold finishing	1,465	....	...	...
Other hot rolled bars	45,627	37,271	7,695	7,640
Pipes and tubes	12,931	12,112	...	...
Wire rods	19,134	15,597	90	116
Hot rolled black sheets	27,776	19,190	...	...
Cold reduced black sheets	3,644	3,644	...	...
Galvanized sheets	8,380	7,808	...	...
Steel castings	8,159	8,202	1,436	1,410
Miscellaneous hot rolled products	21,139	4,074	406	321
All other products	16,424	17,100	303	364
TOTAL	268,497	191,630	12,555	12,149

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of February in net tons, follow:

INDUSTRY	CARBON STEEL	ALLOY STEEL
Automotive industries	6,011	4,129
Agricultural, including farm machinery	13,284	310
Building construction	24,742	59
Containers industry	16,930	2
Machinery and tools	12,365	780
Merchant trade products	18,104	149
Mining, lumbering, etc	4,982	740
National defence	11	3
Pressing, forming and stamping	13,402	63
Public works and utilities	918	50
Railway operating	30,493	245
Railway cars and locomotives	17,743	198
Shipbuilding	2,962	28
Miscellaneous and unclassified	1,329	110
Wholesalers and warehouses	26,632	271
Direct export (a) to British Empire	1,139	1,880
(b) to Other Countries	583	3,132
Total Shipped for Sale	191,630	12,149
Producers' interchange	72,205	209

R-S FURNACE FACTS

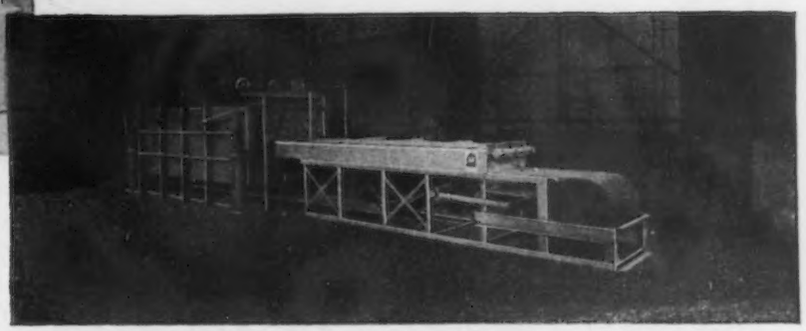
ISSUED MONTHLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

Modern R-S Equipment in Oldest American Iron and Steel Plant

Taylor-Wharton Iron & Steel Co. has been widely known in the iron and steel industry since 1742! The original plant at Highbridge, New Jersey, in continuous operation for over 200 years, has produced for every war in our history and was the first in the country to make manganese steel for the rugged wear of railroad switch and intersectional use. Pictures show an R-S Mesh belt continuous Bright Annealing furnace at the Taylor-Wharton plant at Easton, Pennsylvania. It is used for annealing between draws and final anneal of steel stampings.

Upper pic shows charging end of 12-foot heating chamber. Lower pic shows discharge end of 18-foot cooling chamber. Operating temperature is 1650° F. with 2-zone control. Feed is by continuous 36" wire mesh belt. Heating is electric, 136 KW.

Processing is carried out in a controlled atmosphere supplied from unit partly visible behind the cooling chamber. Atmosphere is retained by a sextuple fringe of heavy asbestos at charging end of heating chamber and discharge end of cooling chamber. The parts in process slide through the fringe as drawn forward on the mesh belt. Gas burners, visible at both ends, capture and burn any atmosphere gas which seeps through the asbestos curtains or escapes as parts disturb the curtain in passing.



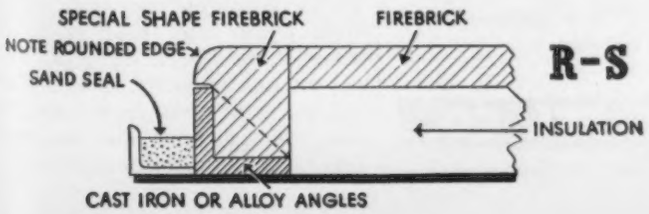
Said a heat-treater fresh from Superior
Of a furnace he saw in Siberia,
"If that furnace works well
I'll be fooled, sure as h...
To an R-S it's surely inferior!"

Well, leave us not pick on the Russians at this critical hour! The plain fact is that an R-S Furnace is superior. Period! A hundred ingenious details of design and construction combine to make R-S Furnaces unique in their ability to produce at low operating cost with a minimum of down-time and maintenance.

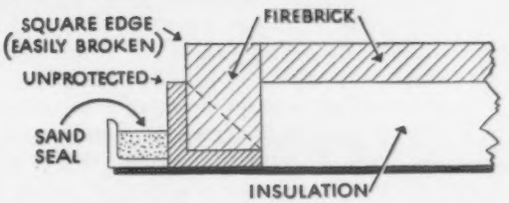
JMLeoP-L1

Save the Edges and you Save all!

We build our movable hearth furnaces (such as car hearth and rotary furnaces) with hearth edge construction as pictured immediately below. Here you see a special type of firebrick so shaped that its rounded edge is almost immune to breakage. Further, it covers the edge of the hearth retaining cast angle so it is protected from the damaging assault of heat coming down from above.



R-S



USUAL

Conventional equipment, shown above, uses common firebrick, leaving a square sharp edge which fractures and crumbles at any slight blow, and offers no protection to the hearth retaining angle from excessive heat.

Time-Saving Methods Help Set Record In Relining a Furnace

Middletown, Ohio

• • • **What is believed** to be a new record for relining a blast furnace was made at the Hamilton, Ohio, plant of Armco Steel Corp., when a 900-ton furnace was rebuilt in 32 days, 10½ hr, from blow-out to blow-in. The time lapse between last cast and new lining first cast was 33 days, 20½ hr.

Several time-saving methods were used in efforts to get the furnace into blast as quickly as possible. In dismantling the top of the furnace the bell rod was burned off and the 16-ton bell dropped into the furnace and melted down. Operation of the furnace continued without the bell until the last cast was made. Dismantling the top units was easier and perhaps 3 days faster by dropping the bell than the normal procedure. Another time-saver was the opening of the hearth and bosh to the extent that a No. 4 bulldozer could take material out to the top of the hearth.

Replacing the usual metal stock line, Armco installed a ceramic stock line of fused alumina and zirconium, the hardest brick known. This is the first trial of this brick, which has a hardness of 9, as a steel stock replacement in any blast furnace in the world.

Working on the project with Armco were the Anderson Construction Co., Buffalo, Champion Bridge Co., Wilmington, Ohio, and A. Benzing & Sons, Hamilton, Ohio.

Normally, a furnace of this size requires about 45 days for relining. The last previous relining of this furnace took 44 days.

The furnace was originally built in 1939. It has an 18-ft hearth diam and is 94 ft high. This has been its third relining, the last being in 1944. Production of nearly 1,250,000 tons was posted at the end of its last campaign.

Dedicates New Electrical Plant at Mexico City

Mexico City, D. F.

• • • **A new electrical** equipment plant, one of the largest privately-operated industries in Latin America, was dedicated here recently by President Miguel Aleman. Established in 1945, Industria Electrica de Mexico, S. A. started production early this year, and will eventually produce a wide range of electric appliances and industrial and central station apparatus.

George H. Bucher, chairman, and William E. Knox, president, Westinghouse Electric International Co., took part in the ceremony. The Mexican company was formed with the aid of the Mexican government, which subscribed about a third of the $15.5 million capital, and Mexican and United States private capital, which account for the other $10 million.

Production according to American methods and standards is made possible by a 20-year license agreement with Westinghouse providing for all technical phases of modern plant layout, operation, and product design. The Mexican company will be furnished with complete specifications and drawings for all products manufactured, as well as information on production methods.

The license and technical assistance agreement also includes the training of Mexican personnel in manufacturing and business procedures in Westinghouse plants and offices in the U. S. These men form the nucleus of the technical and supervisory staff for the company, which is expected eventually to provide work for approximately 2000 employees.

1947 Detrola Sales Soar

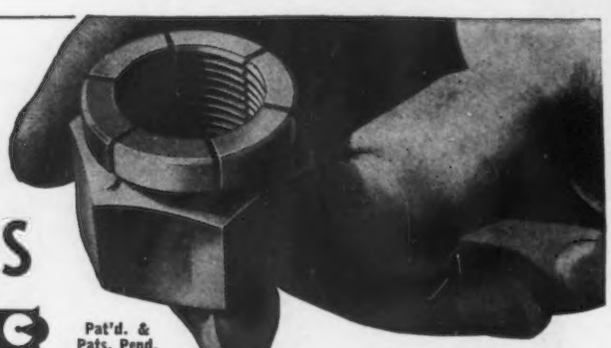
Detroit

• • • **Consolidated net** profit of International Detrola Corp. in 1947 was $1,379,139.10, equal to $1.13 per share, president C. Russell Feldmann announced recently in the company's annual report for the fiscal year ended Oct. 31. The profit was slightly less than 2 pct of sales.

Sales were $71,682,179.65, compared to $40,810,028.22 in 1946. The 1947 sales figure includes for the first time a full 12 months' sales of the Steel Div. and includes only 9 months' sales of Universal Cooler Co. of Canada, Ltd., a subsidiary consolidated Feb. 3, 1947.

The Newport Rolling Mill Div., which includes the corporation's steel plants and coal mine, had sales of $25,139,735.70, equal to 35 pct of the company's total business volume, with divisions in refrigeration, radio, aircraft, and machinery following in that order.

ASK FOR SAMPLES



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Every thread—including the locking threads—takes its share of the load. "Flexloc" accommodates itself to a wide range of thread tolerances . . . can be used over and over again without losing much of its locking torque . . . is not affected by temperatures likely to be met within the field of Mechanical Engineering . . . and being a "stop" nut, it stays locked in any position on the threaded member. The "Flexloc" is processed to have an exceptionally uniform torque. The *Thin* "Flexloc" has become very popular because its *tensile* is so high and the space it occupies so small.

Sizes from #6 to 2" in diameter—in "regular" and "thin" types—in NC and NF thread series. *Write for "Flexloc" Catalog.*

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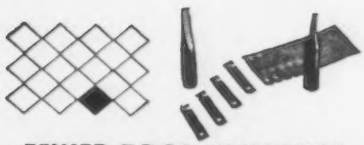
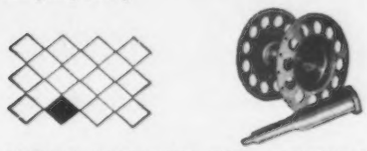


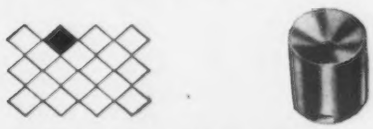
FEWER TOOL FAILURES!

Innumerable tool steels were tried to overcome breakage on these punches. Maximum toughness was needed when working with ½-hard "high" brass ⅛" thick, on a high speed press. But the Matched Set Method *quickly* pointed to Carpenter *Solar* (Water-Tough). In customer's own words: "*Solar* licked the problem—still going strong!"



MORE OUTPUT PER GRIND!

The tool maker "followed the arrows"—moved "south" on the Oil-Hardening Matched Set to get extra toughness needed for this .110" rd. punch. Punching .090" thick .35% carbon steel, production jumped 258% after Carpenter *R.D.S.* (Oil-Tough) was put to work.



LOWER TOOLING COSTS!

Excessive wear, frequent shutdowns for repolishing—until the Matched Set Method was put to work on this extrusion die! When made from Carpenter *Hampden* (Oil-Wear), tools ran 37 days longer between polishings—and there were 132 *less* tools to make per month!

Here's a new, easy-to-use guide that helps you quickly get the many tooling and production benefits of the improved Carpenter Matched Set. With this large Tool & Die Steel Selector Wall Chart, you can easily put your finger on the *right* tool or die steel for each job. Just by "following the arrows"—"north" for extra wear resistance, "south" for greater toughness, etc.—you can actually predetermine tool and die performance! The results are higher output, fewer tool and die failures, lower unit costs. And this Wall Chart is your key to *extra* advantages that go with using Carpenter Matched Tool and Die Steels. With far fewer steels to "work with", heat treating is simplified and inventories are sliced to a minimum.

Decide today to put your tool room on a sound, cost-reducing basis. Ask your Carpenter representative for the new Tool & Die Steel Selector Wall Chart—or, if you prefer, drop us a line on your company letterhead.

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ROLLING DOORS

New York State Asks Steel Firms to Study Newest Ore Deposits

Albany

• • • Twenty-three iron and steel firms with extensive mining interests have been urged to investigate the two new deposits of iron ore explored recently in the Adirondacks, Harold Keller, Commissioner of the New York State Department of Commerce, announced recently.

Mr. Keller declared that the State Commerce Department had communicated with the firms after the discovery and exploration of what may be substantial deposits near Santa Clara in Franklin County. Two seasons of work was done in the field to prepare detailed magnetic maps of these two deposits.

The steel firms were informed that the magnetic maps of the area prepared by the New York State Science Service together with descriptions of the deposits would be available shortly. A ton of iron from New York's Adirondacks, Commissioner Keller pointed out, costs upon arrival at Pittsburgh the same as a ton of iron from the famous Mesabi Range in Minnesota but New York's iron is of a much higher grade.

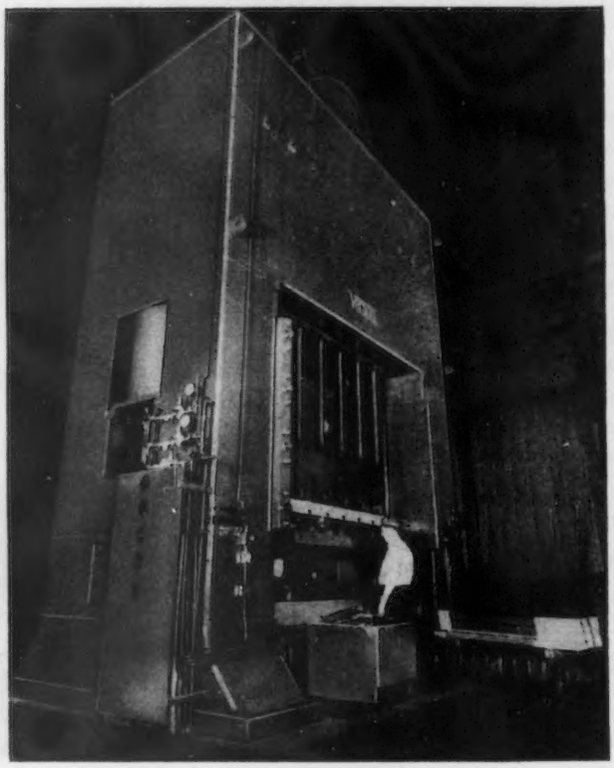
Once an important source of iron during the early history of the nation, production of iron in New York State's Northern Area dropped off during the past 100 years, largely due to the discovery of vast deposits elsewhere. Today, with fear of the nation's waning iron potential the half-billion-ton iron reserve in the northern Adirondacks is regarded as a secondary iron reserve.

Commissioner Keller pointed out that New York State ranks third in iron production in the nation. In 1938, he said, iron production in the State was 500,000 tons. In 1947, production had soared to 10,000,000 tons. The ore is chiefly magnetite which in pure form is composed of 68 pct iron as compared with the 45-50 pct now found in Mesabi Range ore.

United First Quarter Good

Pittsburgh

• • • United Engineering & Foundry Co. reported increased production during the first quarter of 1948 and indicated that financial results for this year should equal or better 1947 figures. F. C. Biggert, Jr., chairman, made these statements here recently at the company's annual stockholders' meeting. He also disclosed that the company plans to build an office building in Duquesne Way, Pittsburgh, which it hopes to complete within a year.



FOR TRACTOR PARTS — *This 2000 ton Verson press was recently installed at the Cleveland tractor plant of the Oliver Corp. It was designed to order for the blanking, piercing, and forming of parts of up to 7/8 in steel.*

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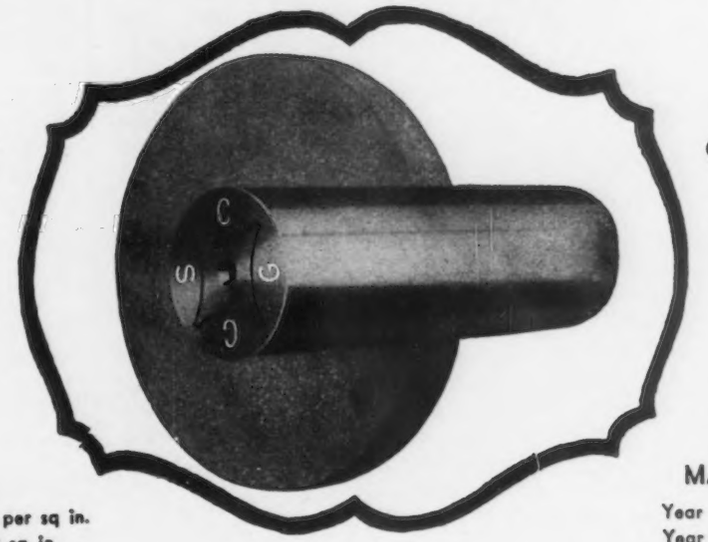

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General Motors Net Sales Top Billion For First Quarter

New York

• • • **Net sales** of General Motors products for the first quarter of 1948 amounted to $1,089,151,693 and net income was $96,481,412, Alfred P. Sloan, Jr., chairman of the board, and C. E. Wilson, president, stated in their report for the first quarter.

They declared that in appraising the results for the period, recognition must be given not only to the relatively high level of physical production and employment but also to the inflation which has occurred. "The general level of all prices is importantly above prewar," they pointed out. "General Motors pay rolls in the first quarter were at a rate that was 175 per cent greater than in the prewar period 1937-1941 while average employment was at a rate nearly 60 per cent greater.

"As has been the case since the end of the war, the 1948 first quarter aggregate sales of GM Diesel locomotives, GM Diesel engines, Frigidaire products and other non-automotive products continued to represent a higher proportion of total volume than in prewar years. In addition, sales for the first quarter included a higher proportion of sales of automobile replacement parts than was the case before the war, even after allowing for the increase in price levels."

Total pay rolls were $317,000,000 in the first quarter of 1948, compared with $270,000,000 in the same period of 1947. An average of 388,-911 employes were on the company's pay rolls in the first quarter of 1948, compared with 375,305 in the first quarter last year.

The 1948 first quarter net sales compared with net sales of $804,-853,209 for the same period of 1947.

After deducting regular dividends of $3,232,078 on the preferred stocks from the net income for the first quarter of 1948, there remained net income of $93,249,334 available for the common stock, equivalent to $2.12 per share on the average number of common shares outstanding.

For the first quarter of 1947, net income amounted to $60,793,191, after giving retroactive effect to adjustments, made later in the year, in the amount provided for depreciation, including increased obsolescence as a result of the program undertaken to meet the postwar demand for General Motors products.

In discussing the increased capital requirements of business, which the report called one of the principal postwar financial problems facing industry as a whole, it said two factors largely accounted for the need for more capital: the much higher price level and the need for replacement, modernization and expansion of facilities. The rise in prices has not only added substantially to the cost of new facilities but has also increased greatly the requirements for working capital.

Noting that additional capital is obtainable from two sources: reinvestment of earnings and the capital market, the report said:

"Because the supply of venture capital is prejudiced by existing high taxes and its investment restricted by uncertainties with respect to unsettled international conditions, the need for additional capital for enterprise is expressing itself to a large extent in terms of new issues of senior securities, such as preferred stocks and bonds, and term loans from financial institutions, and an increased proportion of earnings is being retained in the business. As a result, a lower percentage of earnings than in prewar years is flowing to stockholders in the form of dividends."

In the ten-year period ended Dec. 31, 1941, General Motors dividends were 85.7 pct of the net income available for dividends and profits reinvested in the business were 14.3 pct of net income. During the four war years, 1942-1945, dividends were 70.6 pct of net income and the amount reinvested in the business was 29.4 pct of net income.

In 1946—the first postwar year—earnings were subnormal as a result of a long period of restricted operations due to strikes, material shortages and other factors preventing an orderly flow of production, the report continued. However, dividends were 24.5 pct or $21,414,770 greater than the earnings in that year. Meanwhile the corporation's expenditures for the rehabilitation and modernization of plant, replacement of equipment and tooling for new and improved products had been substantial. As a result it was necessary in 1946 to

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PARCO CLEANER 250
A wash-off type phosphoric acid cleaner containing phosphoric acid and an organic grease solvent. To remove grease, oil, rust, and light annealing oxide from iron and steel surfaces.

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A dry-off type phosphoric acid cleaner which contains phosphoric acid and an organic grease solvent. A touch-up material to remove grease and spot rusting from iron and steel.

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obtain funds totaling $223,000,000 from the sale of 2½ pct promissory notes and a new series of preferred stock.

"Since 1946 capital expenditures have continued," the report said. "At the same time the continued rise in the general price level has increased the requirements for working capital. Despite these circumstances dividends for the two years 1946 and 1947 combined were 67.6 pct of net income, and for the year 1947, 50.4 pct of net income.

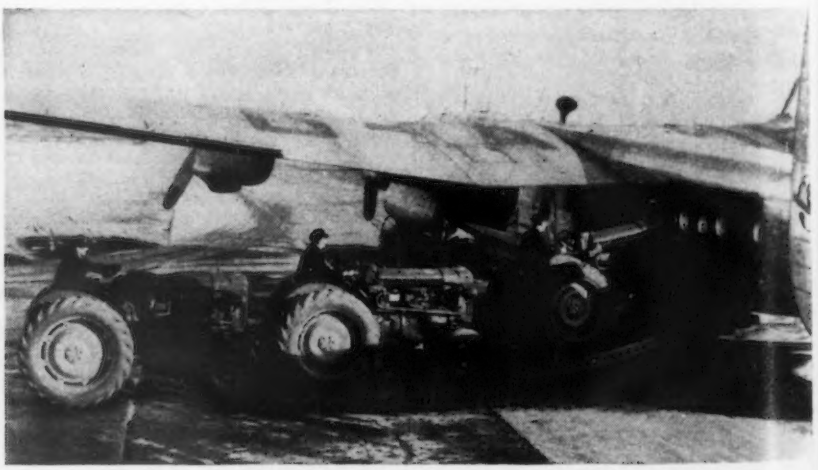
"Inflation affects the cost of doing business just as it affects the cost of living. Higher prices mean higher costs for new facilities. Reserves set up on the basis of original cost become insufficient for the replacement of worn out or obsolete plant and equipment. Even though physical volume remains the same, more working capital is required to carry on the day-to-day operations of the business. More money is required for receivables; more must be invested in inventories. Cash balances must be substantially higher to carry on the business."

The report illustrated these facts with a chart showing that sales in dollars of General Motors products for 1947 were two and one-third times the average sales for the prewar years 1937-1941; inventories and receivables, as of Dec. 31, 1947, were more than two and one-half times the prewar average; and real estate, plants and equipment, less reserve for depreciation, were more than one and three-quarters times the 1937-1941 average. However, net capital employed in the business as of Dec. 31, 1947, was about one and one-half times the 1937-1941 average.

"Hence," the report declared, "it is clear that notwithstanding the additional capital obtained from outside sources and the retention of an increased percentage of earnings in the business, General Motors was operating at the end of 1947 with relatively less net capital in comparison with its business volume than was the case prewar as measured by the 1937-1941 average."

Total sales to dealers in the United States and Canada and shipments overseas amounted to 536,848 General Motors cars and trucks for the first quarter of 1948. This compares with 450,227 for the first quarter of 1947.

The report said the coal strike, which began on March 15, did not affect operations in the first quarter, but that it lasted long enough to cause a loss in steel production which is being felt in the second quarter.

"Both demand for goods and supply of goods are influenced by the effects of the war and it aftermath. Plants and machinery for greater production of GM products have been available but shortages of raw materials have not permitted the increased rate of production these facilities could provide. The demand for GM cars and trucks has been far in excess of the 3,753,000 we have been able to produce in the two and one-half years since the end of the war, and the backlog of unfilled customer orders for motor vehicles continues to increase. There has been a similar active demand for GM Diesel locomotives, GM Diesel engines, Frigidaire products and other non-automotive products."

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